Southern Power & Industry

he Industrial and Power Journal of the South and Southwest

SPI . . . 77th Year

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FEBRUARY, 1960

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6 Ton Hot Reheat Header

Model test set-up of hot reheat line as reproduced above is approximately 1/10th actual size of the model. Circled area shows position of chrome-moly header in the line.

Size of this hot reheat header can be seen by comparison with men in the picture. It is 21" O.D., fabricated of 2¼% chrome, 1% molybdenum steel.

PRETESTED and PREFABRICATED by Pittsburgh Piping

PART OF A COMPLETE HIGH-PRESSURE, HIGH-TEMPERATURE PIPING SYSTEM

The model shown above exactly duplicates—from an engineering standpoint—a hot reheat line which is part of a high-pressure, high-temperature piping system fabricated by Pittsburgh Piping.

The inset shows the position and relative size of the header in the line, and the main illustration is an actual photograph of this header as fabricated in our shops. The complete system, which includes chrome-moly and stainless steel piping fabrication, is one of scores of installations which we have model-tested, fabricated, and erected.

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Volume 78 Number 2

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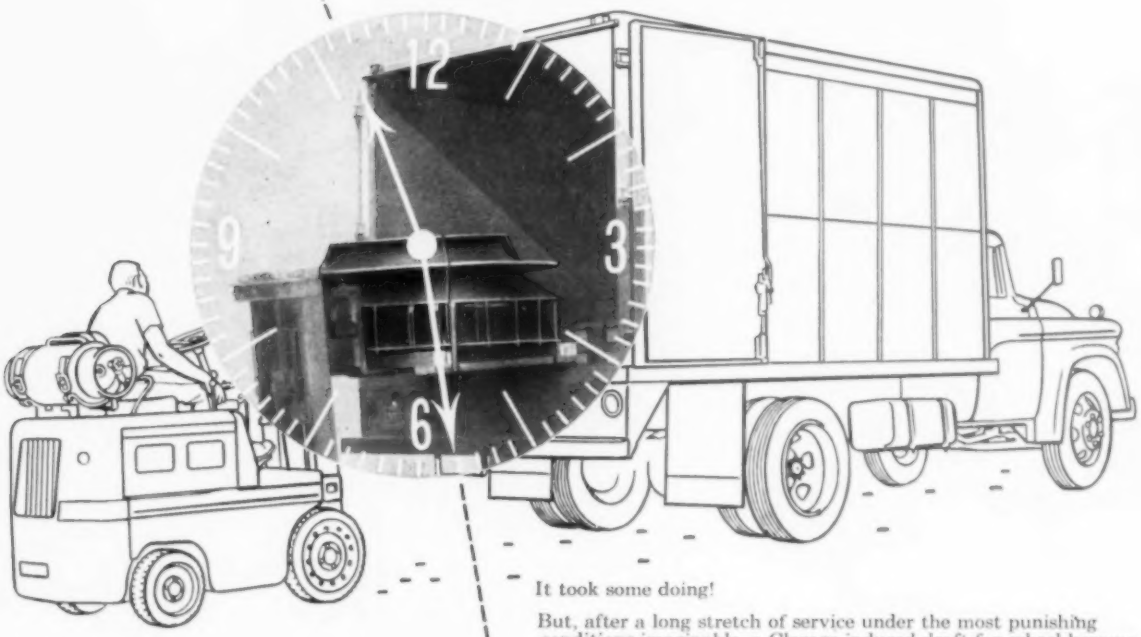

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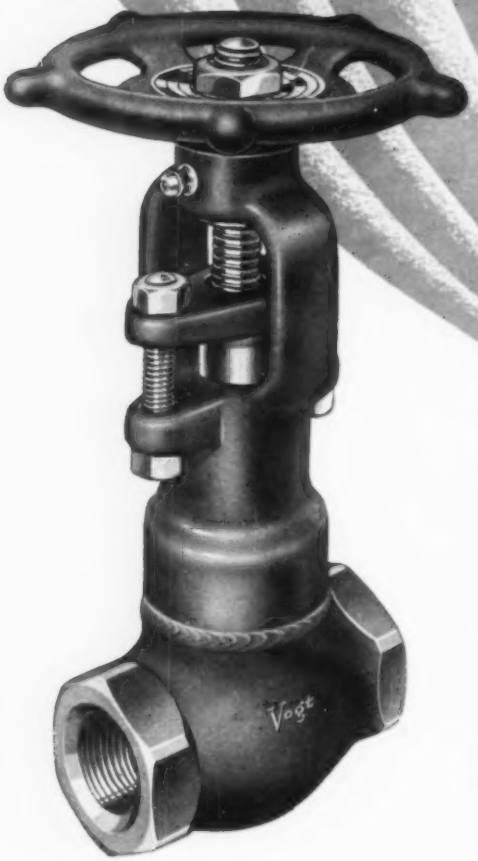

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Facts and Trends

February 1, 1960

◆ INDUSTRIAL GROWTH in 1959 brings a record-breaking number of new jobs and added payroll to the two-state area served by Carolina Power & Light Company. The year-end figure for new and expanded plants is $75,445,060, a 37 per cent increase over expenditures in 1958.

These expenditures will create 13,283 new jobs, 54 per cent more than in 1958, and $39,671,500 in new payroll annually, 59 per cent over the previous year. The 177 projects cover a wide range of industrial processes: electronics, chemicals, synthetics, textiles, furniture, metals, glass, rubber products and others.

◆ GAS LUBRICANT — Equipment designers considering the use of gas-lubricated bearings may find valuable guidance in an Air Force report of the advantages and problems associated with such bearings.

The report, PB 151946 "Gas-Lubricated Bearings, A Critical Survey," Columbia University for Wright Air Development Center, U. S. Air Force, July 1958, may be ordered from OTS, U. S. Department of Commerce, Washington 25, D. C. It contains 298 pages, price $4.00.

◆ LARGEST ROTATING MACHINE — Largest of the 22 wind tunnels and test cells at the U. S. Air Force's Arnold Engineering Development Center in Tullahoma, Tenn., is the propulsion wind tunnel comprised of a transonic unit now in operation and a supersonic circuit nearing completion.

The propulsion wind tunnel — one of the three major laboratories at the Center — is powered by the world's largest rotating machine. Built by Westinghouse Electric Corporation, the machine is over 480 feet long and develops 216,000 horsepower to operate the tunnels. It includes the world's two most powerful synchronous motors, each rated 83,000 horsepower, and two smaller "starting" motors of 25,000 horsepower each. The four motors are connected in tandem to drive two huge compressors.

◆ TITANIUM WELDING — The best methods for welding titanium piping and tubing by the gas tungsten-arc process are explained in a 24-page report published by the American Welding Society.

The booklet is the first national publication to give the complete story of titanium welding. It will solve many problems for those who are involved in titanium fabrication since it gives authoritative procedures which can be followed with confidence. Copies are available from the American Welding Society, Dept. T, 33 West 39th Street, New York 13, N. Y. Price $1.50 per copy.

◆ NUCLEAR PIPING — The first national publication on welding ferrous materials for nuclear power piping operations has been compiled by nuclear power experts and represents their combined knowledge of the best methods and procedures to be used in this new industry.

This hitherto unpublished material will prove of value to everyone concerned with nuclear power operations. It is short, con-

(Continued on Page 6)

Former bearings took a day . . . this bearing replaced in 1 hour and a half!

Here is one of several 4-7/16" shaft size split roller bearing pillow blocks installed on large, high speed fans at the Kaiser Aluminum & Chemical plant in Baton Rouge, Louisiana. Split roller bearings were purchased by Kaiser after thorough study and on the recommendation of our sales engineers! Our recommendation was based on the ability of these bearings to stand up under constant use and because it is split right-down-to-the-shaft, removal is both simple and fast.

Shown above is Maintenance General Foreman, Ivy Ingram, with the bearing his crew replaced in only one hour and a half. It formerly took many more hours to pull the sheave or coupling, pull the bearing, dress the shaft and install a new bearing. With this new split bearing, they simply removed six cap bolts and went to work.

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cise, completely up-to-date and is the experience of men who have learned by trial and error the best methods to use. Copies may be obtained from the American Welding Society, Dept. T, 33 West 39th Street, New York 13, N. Y. Price $1.50 per copy.

◆ PVC EXTRUSIONS — "A Guide to Rigid PVC Custom Extrusions" is the title of a bulletin now available from Alpha Plastics Inc., 78 Okner Parkway, Livingston, N. J.

The illustrated bulletin describes the features of polyvinyl chloride which has provided both performance and cost advantages over metal extrusions and rolled forms in hundreds of applications. Also included are sections on PVC part design and factors in selecting PVC.

◆ SOLAR COOLING — An experiment using the sun's heat to power air conditioning units was described at the Annual Meeting of The American Society of Mechanical Engineers.

In a paper presented at the meeting, Melvin M. Eisenstadt, The Martin Company, Orlando, Florida, and Frank M. Flanigan and Erich A. Farber of the University of Florida, said that using sunshine to power an air conditioning unit is a logical idea, since the hotter the sunshine, the more power it provides and the more heat a solar air conditioning system could remove. Copies of paper #59-A-276 are available at 80¢ each from the Order Department, ASME, 29 West 39th Street, New York 18, N. Y.

◆ A GIANT BALLOON has given a new boost to winter construction, according to a plastics expert who also noted that this is only one of many important developments in the booming plastics film field.

The balloon, made of polyethylene film, is spread over the construction site and supported with air from a low pressure fan. The translucent film keeps the materials and the workmen from freezing and provides the men with plenty of light to work by. Polyethylene is low cost and easy to handle, too, he said. Copies of paper #59-A-261 by T. E. Werkema are available at 80¢ each from the Order Department, ASME, 29 West 39th Street, New York 18, N. Y.

◆ BUTTERFLY VALVES — Typical of the trend toward increased use of butterfly valves in steam stations are the 54-inch standard 50-lb Allis-Chalmers rubber-seated butterfly valves on condenser water service at the Potomac Electric Power Company, Dickerson Generating Station in Dickerson, Maryland.

Estimated space savings are appreciable in steam stations taking advantage of the smaller, lighter butterfly valves. They are particularly effective in plants using sea water because the natural rubber seating material protects against corrosion and the smooth discs are of bronze.

◆ FARMER? — Now the Census Bureau has changed its definition. A farmer must have 10 acres and sell $50 a year in farm products. This is an average of less than 14 cents a day. A person owning less than 10 acres will be counted as a farmer only if he shows sales of $150 a year in farm products, an average of about 41 cents a day. Previously he did not have to sell anything.

As a result of this more realistic definition, an estimated 400,000 "farms" have gone up in statistical smoke. The effect will be to show higher average income per farm, and this will weaken arguments for more federal aid to agriculture. Heretofore, production from one-sixth of the nation's farms has accounted for two-thirds of the farm products sold.

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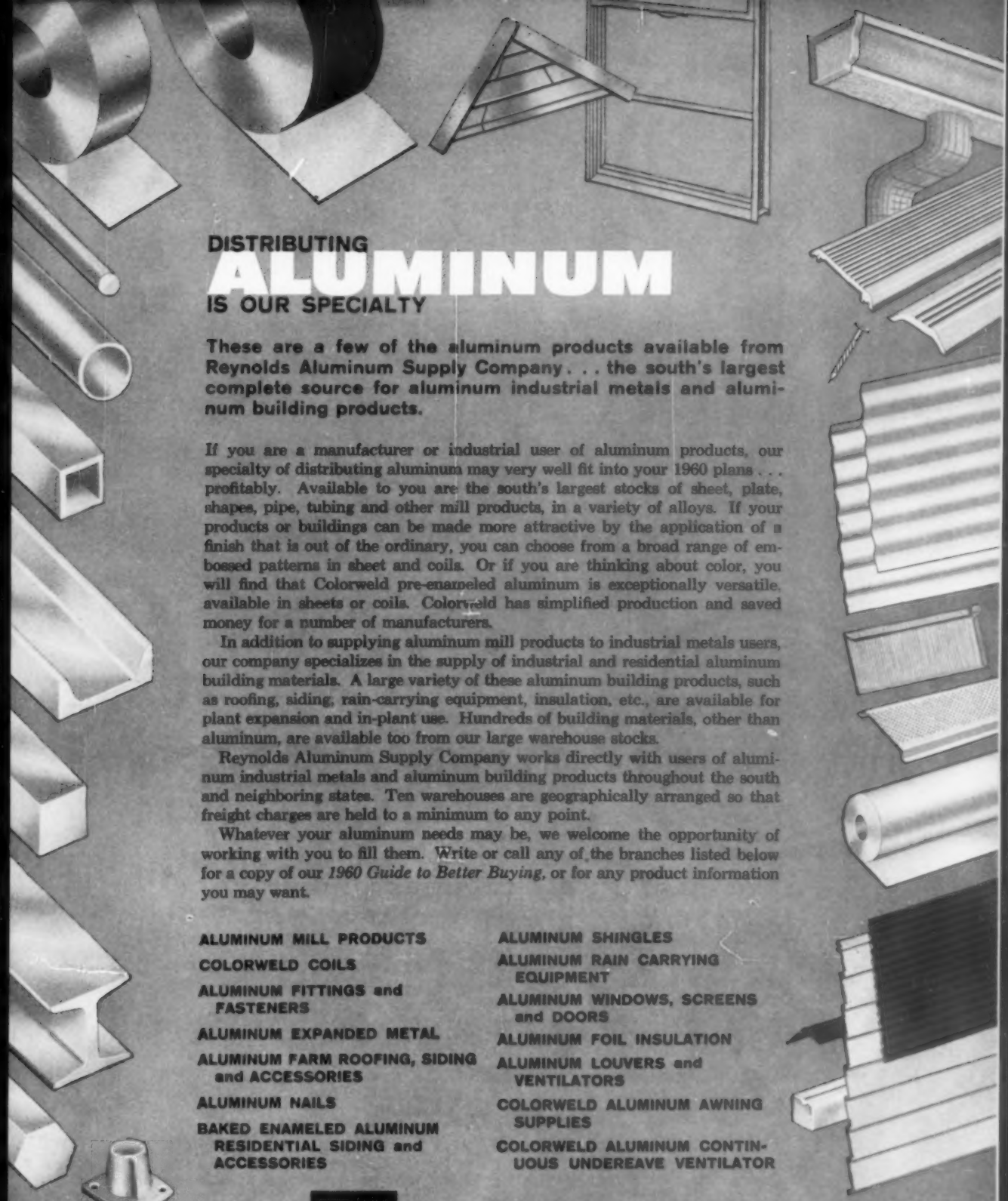

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Facts and Trends — Continued from Page 6

◆ RADIOISOTOPES — Among the twenty major American industrial groups utilizing radioisotopes, the petroleum refining industry reaps the largest benefit, the National Industrial Conference Board reports in releasing a census which the Board has compiled under contract with the Atomic Energy Commission.

In a twelve month period in 1957-58, thirty-three petroleum refining companies had an annual investment in radioisotope facilities and equipment of $295,000, and a net savings of $11,728,000. Over $5 million of this saving came from the use of radioisotopes in research studies, while another $4 million was derived from level controls and density measurements. The largest number of radioisotope users, however, is found in the paper industry. Ninety-nine in this industry reported the use of radioisotopes.

◆ MORE INFORMATION — Complete automation of steam generating stations is now an engineering and economic reality, according to a General Electric spokesman who also announced his company's readiness to undertake full automation of generating plants.

Arthur F. Vinson, vice-president and group executive of the company's Apparatus and Industrial Group, said: "The recent development of transistorized digital computers compatible with existing sensing devices and automatic sub-systems has made the automatic steam station an engineering reality. The application of such computers to provide continuous precise control will make it an economic reality."

◆ BETTER BATTERIES — About one-third of the Bell System's annual expenditure for power equipment is for storage batteries to back up the usual alternating current power supply, the Winter Meeting of the American Institute of Electrical Engineers was told by R. C. Shair of Gulton Industries.

The most common battery in use today is the lead-acid battery because of its low cost, the availability of raw materials and the fact that it is better known. An alloy of lead-antimony has been used as a battery grid, giving a life service of 14 years. Substitution of calcium as the alloy, however, has increased life of the battery to 25 years, he said.

◆ D-C CRANE POWER — Recently improved metallic rectifiers have made direct current available for control of large magnetic cranes, it was reported at the Winter General Meeting of the AIEE by Square D Company engineers.

They listed as advantages: faster hoisting and lowering speeds, greater stability in lowering heavy loads, better hoisting characteristics and faster acceleration, maximum safety and simplicity, four collectors in place of 10 or more in the usual a-c hoist control, and better voltage regulation.

◆ TANTALUM — Commercial production of the world's largest sheet of non-welded tantalum by a newly perfected process has been announced by the Kawecki Chemical Company.

The new size sheet, 36 inches wide by 72 inches long, will be used primarily in the construction of chemical reaction tanks where it will substantially reduce the possibility of contamination and effect cost savings. The large size tantalum sheets will cost $59.16 per pound -- the same as for smaller size sheets.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 8, Ga.

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says Mr. Ray Hilton, President and General Manager, Higham-Hilton Plumbing Co., Salt Lake City, Utah

Easy threading! Characteristic uniformity of Spang Pipe provided fast, accurate threading on the Wagner Bag job. All connections were either welded or coupled.

Wagner Bag Company Building heating, cooling and plumbing systems serviced by 2 miles of Spang Steel Pipe

"Spang Steel Pipe is a good, uniform pipe, easy to thread and bend, and has a smooth interior finish free of any obstructions," says Mr. Hilton. "About 90% of the pipe installed on the Wagner Bag Company job is exposed; it makes a good, clean appearance.

"We used Spang Pipe on this job because of our past experience with it, and because we could get good delivery when we needed it. It gave us a smooth, trouble-free installation. We expect it to provide good service for the life of the building. I think it's one of the best products on the market."

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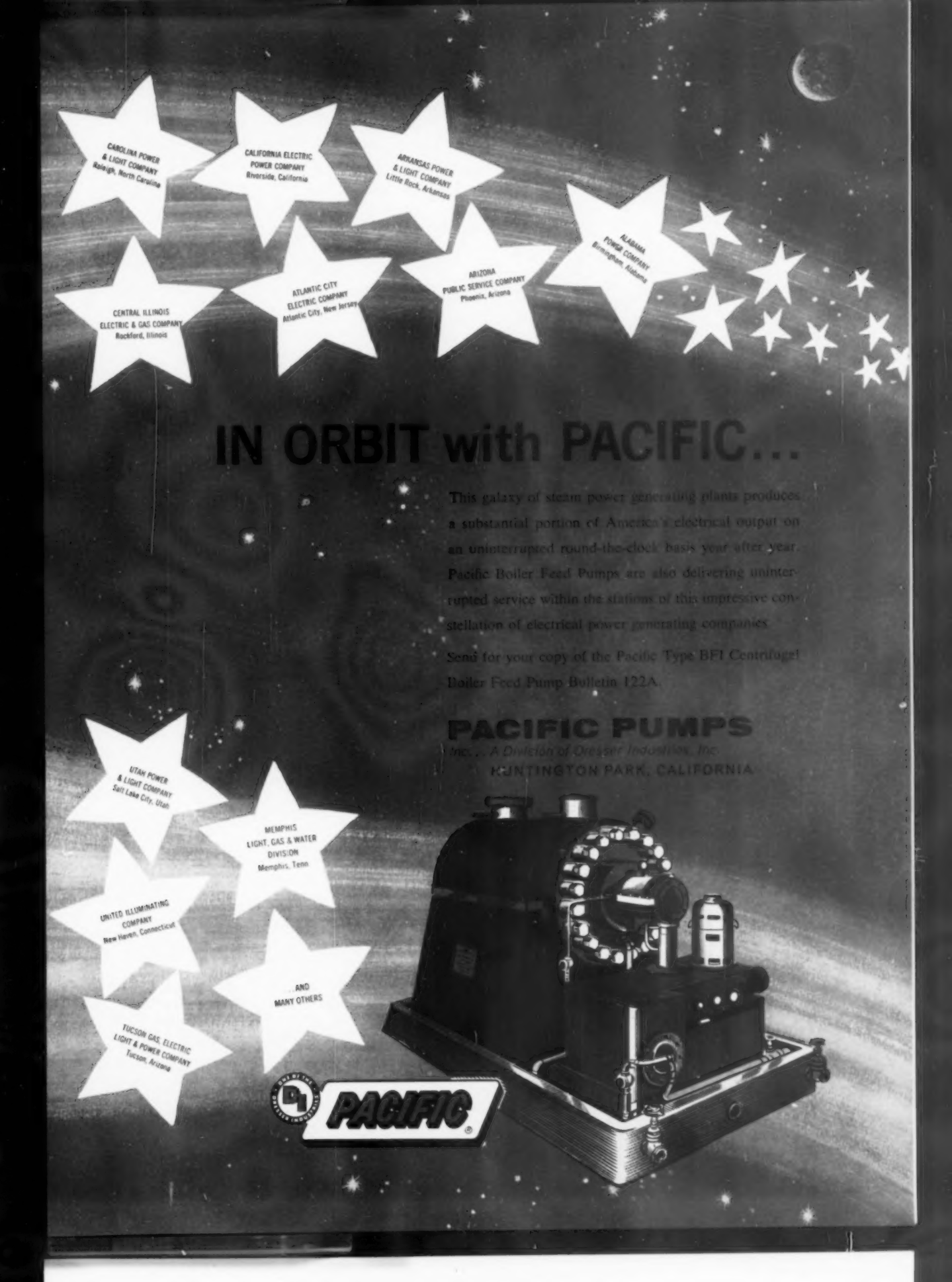
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the SOUTH—SOUTHWEST

more power . . . more plants . . . more money

Homelite Dedicates Greer, S. C., Plant

Homelite, a division of **Textron Inc.,** made the formal dedication of its new plant in **Greer, South Carolina** in December. Here Homelite will manufacture pumps, generators, blowers, ride-on mowers and other products. Built by Daniel Construction Company of Greenville, South Carolina, the modern, streamlined plant is almost a duplicate of the Homelite Chain Saw plant which was dedicated two years ago in Gastonia, North Carolina.

The Greer plant is a one story building, except for a brief second floor housing an attractive cafeteria. The 150,000 square foot building is constructed of brick, concrete and steel with long span steel joints supporting the roof to eliminate the clutter of too many columns in the interior.

The open interior makes use of "straight line" manufacturing techniques coupled with the latest automatic machinery. The plant will eventually employ 400 to 500 men and women.

H. D. Lee Expansion — Ala.

The H. D. Lee Company of Kansas City is in the midst of an expansion program at its Boaz, Ala., plant, which will include the addition of more equipment to expand daytime operations and will require the employment of additional personnel. The plan includes addition of a night shift equal in number to the daytime shift. Employment of this additional personnel will more than double the present payroll.

This expansion of the Boaz operations is in addition to the recently announced construction of a new plant in Virginia and is a part of the company's continuous expansion and development throughout the Southeast. Mr. J. L. Elder is local manager.

New Crossett Plant — Ark.

The Crossett Company will build a $6 million plant at **Crossett, Arkansas,** to produce medium density wood shavings board from gum wood under a franchise issued by Roddis Plywood Corporation of Marshfield, Wisconsin.

Construction on the large plant will start early in 1960 and be completed within about 18 months. It is anticipated that the operation will employ something over 100 persons and have an annual payroll of more than $500,000. Plans are to run the plant 24 hours per day, seven days per week except for necessary shutdowns for maintenance. Capacity of the mill is to be 100 tons per day.

The plant will be constructed on a 20 acre site adjacent to the main facilities of Crossett Lumber Company. It will be housed in a building 800 feet long and from 85 to 250 feet wide.

Tidewater Plant — Texas

Construction of **Tidewater Oil Company's** sulphur - recovery and cycling plant has been started by Brown and Root in the New Hope Smackover Field in Franklin County, in northeast Texas.

As the producer of 224 long tons of sulphur per day from 50 million cubic feet of raw gas, the new plant will be the largest plant of its type in Texas and the second largest in the country. Completion of the new plant is scheduled for early fall of 1960.

Airco Plant — Baton Rouge

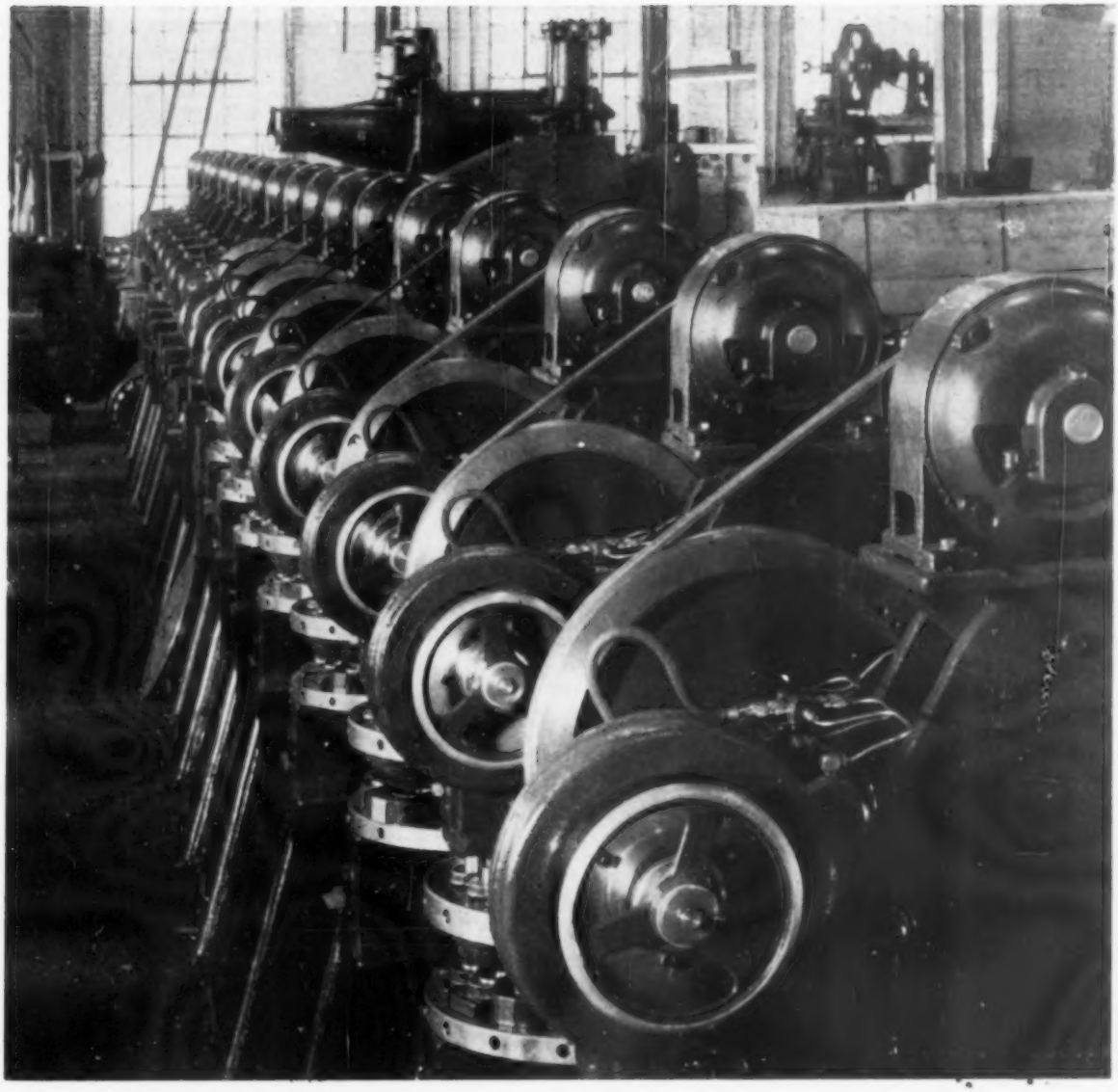
Air Reduction Sales Company has started construction of an air separation plant at Baton Rouge to supply high purity liquified industrial gases to the Gulf States area. The new plant, which will cost over $2,000,000, will have a production capacity of 30 tons of liquid oxygen, nitrogen and argon per day.

The initial phase of construction is being carried out by H. E. Wiese Inc., Baton Rouge, with completion of the entire plant scheduled for the Spring of 1960.

CP&L Expansion — Goldsboro

The Carolina Power & Light Company, Raleigh, N. C., has announced plans to build a 320,000 horsepower (240,000 kw capability) coal fired steam electric generating unit as an extension to its Goldsboro plant.

Contract for the plant addition scheduled to be completed in 1962 was awarded to Ebasco Services Incorporated. It is part of a long range construction program. A similar plant at Darlington, South Carolina, now under construction, is scheduled for completion in 1960.



Higher speeds . . . higher efficiency . . . higher replacement cost

There was a time when a new gear or an odd part for machinery cost little more than the price of a few gallons of lubricating oil . . . but those days are gone forever. Today's power machinery is built for high speeds and higher efficiency. Parts are precision made, and replacements are sometimes prohibitively expensive.

The correct lubricant at the proper point in dependable form is a simple necessity in today's power machinery. The Standard Oil Company has made the servicing and supplying of such lubrication its business for over 70 years. The *first place popularity* of Standard Oil lubricants in the southern power industry has proved their dependable performance beyond doubt.

* * *

For lubrication that you can rely on for full protection against costly, unnecessary losses call in a Standard Oil lubrication representative today.

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LUBRICANTS

STANDARD OIL COMPANY
(KENTUCKY)

Persons in the know
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HATFIELD Electric Co.,

a leading electrical contractor,
installs–

FUSETRON dual-element Fuses

in its new office building

Mr. Brown, Vice-President tells why . . .

"For our own buildings and our recommendations to our industrial and commercial customers, we feel that FUSETRON fuses are the most reliable means of over-current protection that has been made available to us.

"We require protective devices for industrial and commercial application that not only provide adequate short-circuit protection but also protect against needless blows. In dead-front panel equipment it is especially desirable that they operate cool and efficiently. Of course FUSETRON fuses provide this.

"The additional protection features of these devices are of continual interest to our customers, and we feel their use is to our mutual benefit.

"As a matter of further interest, we are remotely mounting the fluorescent ballasts throughout our own offices and adding your fuse blocks with indicating FUSETRON fuses for better protection and lower maintenance."

William L. Brown.
V. P. HATFIELD ELECTRIC CO.
CLEVELAND, OHIO

This Hatfield Electric Co. installation underscores the need for . . .

LIFE-TIME DEPENDABILITY AND HIGH INTERRUPTING CAPACITY IN A MODERN PROTECTIVE DEVICE — *You Get Both With* FUSETRON Fuses . . .

THERE IS A BUSS OR FUSETRON FUSE FOR EVERY ELECTRICAL NEED

SAFE PROTECTION THROUGH THE YEARS . . .
without maintenance or recalibration costs.

FUSETRON fuses remain safe and accurate because, unlike mechanically operated devices, they have no hinges, pivots, latches or contacts to stick or get out of order.

FUSETRON fuses are *calibrated at the factory by engineers.* Once properly installed, they require no maintenance — no periodic inspection and accompanying down-time.

PROTECT AGAINST HIGH FAULT CURRENTS

A modern protective device must provide protection against today's heavy fault currents — and be able to protect against even greater fault currents that might develop in the future.

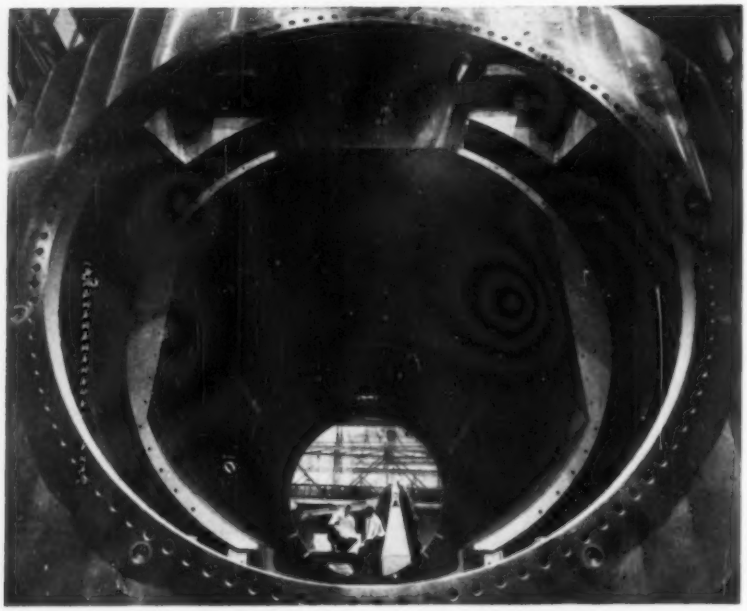
You get this protection with FUSETRON fuses. FUSETRON dual-element fuses have an interrupting rating of 100,000 amperes rms symmetrical.

Electrical Protection goes MODERN with FUSETRON fuses because they are adequate for today's conditions and for anticipated growth in service demands.

For More Information on FUSETRON *dual-element fuses . . . Write for bulletin FIS*

BUSSMANN MFG. DIVISION, *McGraw-Edison Co., St. Louis 7, Mo.*

News of the South-Southwest — more power . . . more plants . . . more money



Power For Arkansas

More than 14 feet in diameter and 30 feet long, this steel frame will house the world's largest 3600-rpm turbine-generator. The unit is now under construction at the Westinghouse Electric Corporation's East Pittsburgh plant.

Rated at 384,000 kilovolt amperes, the completed unit is scheduled to be delivered to the Arkansas Power and Light Company's new station near Helena during the summer of 1960.

The 325,000-kilowatt steam turbine to drive the generator is being built at the Westinghouse plant in Lester, Pa.

Ford Expands Its Nashville Glass Plant

Ford Motor Company is expanding its facilities in the South with the addition of 274,000 square feet of floor space to the **Nashville Glass Plant**, already the world's largest automotive glass-producing facility.

The glass melting capacity of the huge plant will be doubled. When completed early in 1961, the plant will be nearly 1,500,000 square feet. Employment is expected to be increased by about 400 jobs when the added operations are started. The plant now employs 2,000 workers. The Nashville expansion will be a multimillion-dollar project.

Multimillion-dollar Mill for Port St. Joe

The newly-organized **Florida Gulf Fibre Company** is starting construction of a new $13,500,000 semi-chemical corrugating medium mill at Port St. Joe, Fla.

The new mill will be fully integrated and operated entirely independent of St. Joe's big Kraft containerboard mill. It will employ approximately 300 persons and will be located near the present St. Joe mill. Early 1961 has been set as the target date for initial production of corrugating medium.

The product of the mill will be used in the manufacture of corrugated shipping containers by companies all over the nation. The new facility, for which a paper machine 236 inches wide will be installed, will utilize the hardwoods of forests in Western Florida.

Reynolds Silicon Plant, Ala.

To handle its increasing production of silicon aluminum alloys for the foundry industry, Reynolds Metals Company will build a silicon plant at its Listerhill Reduction Plant near Sheffield, Ala.

Reduction Plant Manager R. B. Newman said the electric furnace operations would have a capacity of about 5,000 tons of silicon metal per year. Silicon metal is added to aluminum to increase hardness and castability.

Construction is expected to begin about the middle of 1960. The 3,600-degree electric furnace for the plant will be supplied by the Electromelt Furnace Division of McGraw-Edison Company. The plant is being designed by Reynolds Central Engineering Department in Richmond, Va., so that additional furnaces may be added later.

It is anticipated that silicon production at this plant will fulfill the requirements for silicon metal at Listerhill and a portion of the requirements at other Reynolds reduction plants.

New Air Separation Plant — West Virginia

Linde Company, Division of Union Carbide Corporation, announced recently that a new on-site oxygen and nitrogen producing plant to serve **Mobay Chemical Company** at New Martinsville, West Virginia, has gone on stream. This unit will produce 25 tons per day of medium purity oxygen simultaneously with 25 tons per day of high-purity dry nitrogen. The oxygen will be used in various isocyanate processes.

This plant is integrated with Linde's network of liquid production plants and for that reason the consumer is never entirely dependent on the reserve storage supply of the on-site plant. Liquid oxygen or nitrogen can be transported by truck or rail to fill requirements brought about by scheduled or unscheduled shutdowns or unexpected demands.

Stein Hall Plant, S. C.

Stein Hall & Co., Inc., recently dedicated a new subsidiary, **Stein Hall Southern Inc.**, in **Charleston, South Carolina.**

General Mark W. Clark headed the committee of state and city officials which welcomed the company to their new $800,000 plant and warehouse. The building was erected under the direction of South Carolina State Ports Authority. Plant manager is Harry Vogel, formerly assistant plant manager of another Stein Hall subsidiary.

The plant will process guar, a gum extracted from the seed of the guar plant which grows in India and Pakistan. The processed prod-

(*Continued on Page 22*)

New from American-Standard
Industrial Division

Power-Lift† for Power Plants

Power-Lift is a timely new concept of coordinated products and services from American-Standard Industrial Division. Its purpose is to help you raise overall efficiency in your plant by offering *products* that are proved in the field and designed, engineered, and manufactured to a uniform standard of quality and performance . . . with service by product specialists in every principal city.

To see how Power-Lift services can benefit you . . .

LIFT THE FLAP

† Service mark of American-Standard

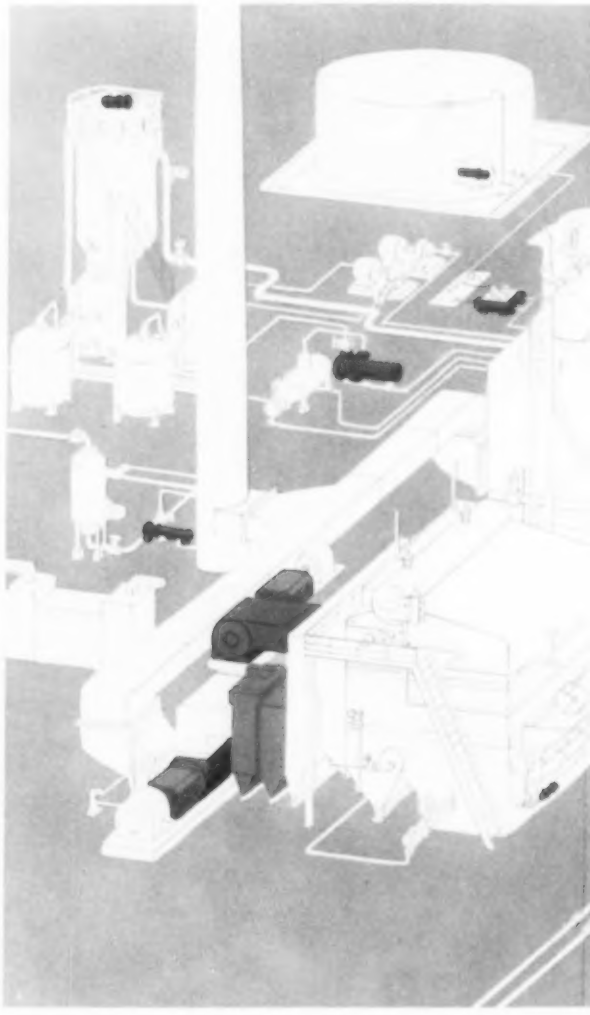
American-Standard Industrial Division POWER-LIFT IN ACTION

1959

Early in 1959 three American-Standard divisions—American Blower, Ross Heat Exchanger, and Kewanee Boiler—were combined into a single organization under a new name: American-Standard Industrial Division. The year 1959 was spent fruitfully—consolidating product lines, accelerating new product development, gearing up to meet the stepped-up requirements of the fast-paced, highly specialized power industry.

1960

Today, we're confident that you'll find new benefits in specifying products from American-Standard Industrial Division . . . products that now encompass the major fields of heat transfer, mechanical draft, boiler feed pump and fan control, fly ash and dust control, heating, ventilating, and air conditioning. The illustration at right shows where many of these products may be applied in a modern steam plant. Each is designed, engineered, and manufactured to help you produce power efficiently and economically. Each is backed by an honestly won reputation for reliability on the job.



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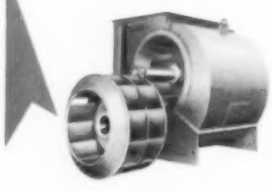
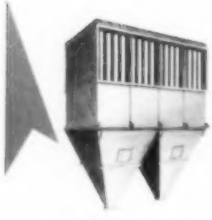


Mechanical Draft Fans



Dust and Fly Ash Collectors

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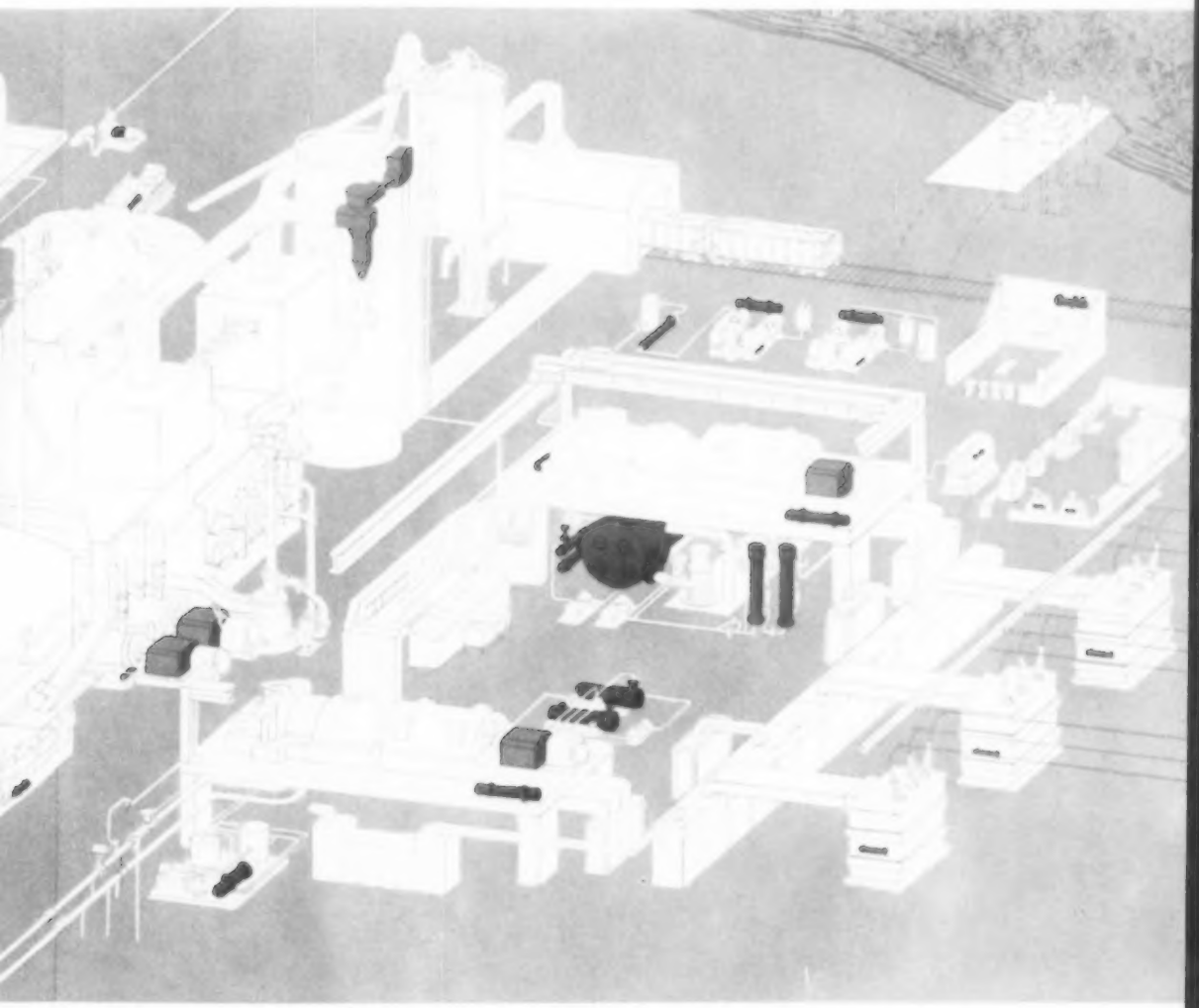
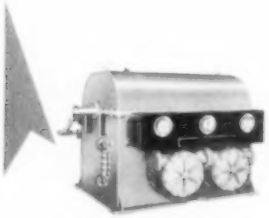
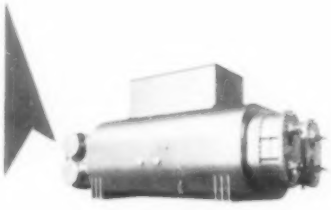


here some of American-Standard Industrial Division products serve in a modern power plant.



Gyrol® Fluid Drives for fan and feed pump control



Surface Condensers and Feedwater Heaters

Heat Exchangers and After Coolers

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Talk over your requirements with an American-Standard* Industrial Division product specialist. You'll find him well prepared and experienced—frequently able to base equipment recommendations upon precedents of proved success. And, in many instances, our comprehensive standardization paves the way to savings in time and cost. Offices in all principal cities. AMERICAN-STANDARD INDUSTRIAL DIVISION, DETROIT 32, MICHIGAN. IN CANADA: AMERICAN-STANDARD PRODUCTS (CANADA) LIMITED, TORONTO, ONTARIO. EXPORT DIVISION, AMERICAN-STANDARD, NEW YORK CITY.

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Designed to service the largest of today's and tomorrow's steam turbines. Low bundle entrance velocity; liberal steam transportation lanes; moisture impingement grids to extend tube life; expansion diaphragms; effective de-aeration and many other features created during 40 years of surface condenser development and research.

MECHANICAL DRAFT FANS

Complete range of sizes and types for forced draft, induced draft, gas recirculating, and primary air fan applications. Designed to meet rigid requirements of modern power plants where maximum pounds of steam are produced daily at peak efficiency. Airfoil, forward curved, backwardly inclined, radial, radial tip blades.

FEEDWATER HEATERS

Design incorporates unique new High Pressure closure. Maintenance is simplified with only four major parts. Exceptionally high safety factor built into all units—more than double ASME Code requirements. Temperature stresses from start-ups or load changes virtually non-existent.

HEAT EXCHANGERS

Designed and built with thoroughness and precision. Standard or specially engineered units for virtually all conditions and applications, including high pressure-high temperature exchangers, compressor inter- and after-coolers, fuel oil heaters, blow-down exchangers, and many others.

GYROL® FLUID DRIVE

Provides stepless adjustable speed control for fans and boiler feed pumps. Performance, power savings, and reliability proved in the field. Units for motor driven boiler feed pumps or for "on-the-shaft" duty on main turbine generator. Drives are available for fan and pump duties for all boiler sizes.

DUST AND FLY ASH COLLECTORS

Type "D" Dust Collector: mechanical "cyclone-type" collector. Series 342 Dust Collector: uses "cyclone" principle, with individual tubes which permit flexibility in design to fit plant layout. Series 361 Dust Collector: combines primary and secondary systems for high efficiency fly ash recovery.

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INDUSTRIAL DIVISION

AMERICAN BLOWER PRODUCTS • ROSS PRODUCTS • KEWANEE PRODUCTS

BOWATERS UTILIZES BY-PRODUCT WASTE AS FUEL

At Bowaters Carolina Corporation, Detroit RotoGrate Stoker, with 6 Detroit air swept spout refuse distributor feeders, installed under Babcock and Wilcox 2 drum single pass steam generator. Steam is produced at 850 psig, 900° F-T.T. Feedwater temperature 300° F. Combustion air temperature is 350° F.

Bowaters Carolina Corporation's new plant at Catawba, South Carolina uses a Detroit RotoGrate Stoker to burn bark refuse under a steam boiler. The installation is designed to produce 200,000 pounds of steam per hour when burning bark alone.

Costly waste disposal measures, which in years past were common to pulp mill operation, have been eliminated.

Provision is made for future firing of coal either in conjunction with bark or separately, and 275,000 pounds of steam will be produced with this combination. Peaks of 300,000 pounds of steam are anticipated.

Oil and gas burners in the furnace walls are presently used for auxiliary firing if refuse fuel is not available in sufficient quantity to supply the demand for steam.

Versatile in their ability to burn a broad variety of fuels . . .

DETROIT ROTOGRATE STOKERS

. . . have an established reputation for efficient performance.

8417

DETROIT STOKERS COST LESS: Cost equals initial investment plus upkeep plus production losses due to equipment outage. *The total is less with Detroit.*

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uct is used in a number of important industries including paper manufacturing, mining, textile and food processing.

Stein Hall Southern will also produce starch products for warp sizing in the textile industry as well as tapiocas and gums for the paper industry.

New Safety Record for Chemstrand — Pensacola

Employees at the **Chemstrand Corporation's** nylon plant at Pensacola, Fla., have completed 17,106,186 consecutive man-hours without a disabling injury to set a new world's safety record for textile plants, exceeding the record they set in 1957.

The achievement drew citations from national, state and local officials, who noted that the plant already is holder of eight Awards of Honor from the National Safety Council.

Edward A. O'Neal, Jr., Chemstrand president, said: "Full credit goes to the Chemstrand plant management and all employees who have worked hard to establish these new safety standards for the textile industry."

FUTURE EVENTS of Engineering Interest

Feb. 1-4: 2nd Southwest Heating & Air-Conditioning Exposition. Dallas, Texas. E. K. Stevens, Pres., International Exposition Co., 480 Lexington Ave., New York 17, N. Y., Mgr.

Feb. 1-4: Instrument-Automation Conferences & Exhibits. Instrument Society of America, Rice Hotel & Sam Houston Coliseum, Houston, Texas. John Johnston, Jr., Pres., ISA, 313 Sixth Ave., Pittsburgh 22, Pa.

Feb. 18-20: Winter Meeting. National Society of Professional Engineers, Broadview Hotel, Wichita, Kans. John T. Kane, 2029 K St., N.W., Washington 6, D. C.

March 6-8: Southern Safety Conference & Exposition. Robert Meyer & George Washington Hotels, Jacksonville, Fla. W. L. Groth, Exec. Dir., Southern Safety Conference, Inc., P. O. Box 8927, Richmond 25, Va.

March 6-9: ASME Gas Turbine Power & Hydraulic Conference. Rice Hotel, Houston, Texas. American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

March 7-8: Heat Transfer Symposium. Mechanical Engineering Department, University of Florida, Room 512 — Engineering & Industries Bldg., Gainesville, Fla. Prof. John C. Reed, Head, Mech. Engrng. Dept.

March 16-18: 23rd Annual Short Course for Superintendents & Operators of Water & Sewerage Systems. Louisiana State University, Baton Rouge, La. Fred H. Fenn, Dean, College of Engrng.

March 29-31: 22nd Annual American Power Conference. Hotel Sherman, Chicago, Ill. R. A. Budenholzer, Conference Director, Mechanical Engineering Dept., Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill.

April 18-20: Southern Metals Conference. American Society for Metals, Tutwiler Hotel, Birmingham, Ala. J. R. Kattus, Chm. '60 SMC, Southern Research Institute, 2000 Ninth Ave. South, Birmingham, Ala.

April 20-22: Symposium on Instrumentation for the Process Industries. Chemical Engineering Dept., Agricultural & Mechanical College of Texas, College Station, Texas.

April 26-28: 41st Annual Convention & Welding Exposition. Biltmore Hotel & Great Western Exhibit Center, Los Angeles, Calif. Information Center, American Welding Society, 33 W. 39th St., New York 18, N. Y.

April 27-29: Sixth Annual Instrument Society of America Conference and Exhibit, and First Pulp and Paper Division Symposium. Pensacola, Florida. G. W. Howlett, P. O. Box 4426, Pensacola, Florida.

May 9-13: 2nd Southwestern Metal Exposition & Congress. American Society for Metals, State Fair Park & Sheraton Hotel, Dallas, Texas. Allan Ray Putnam, Mg. Dir., ASM, Metals Park, Novelty, Ohio.

Parker-Hannifin — Mo.

Appointment of **Sturgis Valve & Fitting Corporation,** 601 South Taylor Avenue, St. Louis 10, Missouri, as a distributor for industrial tube fittings and tube-working tools, and industrial hose and reusable Hozelok fittings is announced by Parker-Hannifin Corporation.

Malcolm B. Sturgis, president of the distributing firm, states that substantial stocks will be maintained to assure prompt servicing of customer requirements. The company also handles Parker piston-type hydraulic accumulators.

Plant Personnel

Vice-president and general manager of Bowaters Southern Paper Corporation at Calhoun, Tenn., and vice-president of Bowaters Carolina Corporation at Catawba, S. C., is **V. J. Sutton,** succeeding D. W. Timmis, who has left for a post in New Zealand.

Harry Vogel is plant manager of Stein Hall Southern, Inc., at Charleston, S. C.

Ray Graves, a native Texan, succeeds Carl A. Wallerstedt as plant manager of Universal Atlas Cement at Waco, Texas.

Head engineer for the Ball Valve Company in Neodesha, Kans., is **Burt Owsley.**

Two long-term employees of The Black & Decker Mfg. Co., Towson, Md., have been advanced to newly created posts: **John M. Fox,** who has been with the company since 1911 (the longest service of any employee) has been appointed Director of Manufacturing. **Thomas M. Griffith,** who has been with Black & Decker since 1925, has been appointed Director of Quality Control.

(*Continued on Page* 26)

Steam trap dependability is a matter of what the manufacturer puts into the trap

ARMSTRONG TRAPS ARE DESIGNED AND MADE TO GIVE YOU DEPENDABILITY

1. Efficient, proved operating principle

Armstrong Traps provide the most advanced development of the time-proven inverted bucket principle. Simple, but effective, there isn't much that can go wrong.

2. Good design

Armstrong Trap design gives big capacity in a small package. The mechanism is virtually fool-proof. All body styles are easy to inspect and maintain without removal from the line.

3. Highest quality materials of construction

Only the best goes into Armstrong Traps. Bodies are close grained 30,000 tensile iron castings or high quality forgings. Working parts are all tough, corrosion resistant stainless steel.

4. Good workmanship

Armstrong Traps are made by craftsmen who take pride in their work. Careful inspection and frequent checking insure the quality of the trap.

5. Application know-how

Your problem has probably been solved already in the extensive experience of the Armstrong engineering and sales organization. You can be sure of sound, dependable recommendations.

Your local Armstrong Representative can show you what Armstrong dependability can do for you. Call him today or write direct.

860 Series for low pressure heating service.

800 Series, side inlet, side outlet.

No. 801, side inlet, bottom outlet.

880 Series, integral strainer.

200 Series, bottom inlet, top outlet.

Forged Steel Series for high pressures, high temperatures.

The 48 page Armstrong Steam Trap Book tells how to correctly size, install and maintain steam traps for any pressure, any temperature, any load plus full catalog data on Armstrong Steam Traps. Ask for Catalog K.

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"See our catalog in Sweet's Plant Engineering File."

"CHARTS"

By SOUTHERN POWER & INDUSTRY gives quick solutions for everyday problems.

This 74-page, 7x10" Manual Serves the Needs of Plant Engineering-Operating and Maintenance Personnel.

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- Power Plant Machinery Profit — 72

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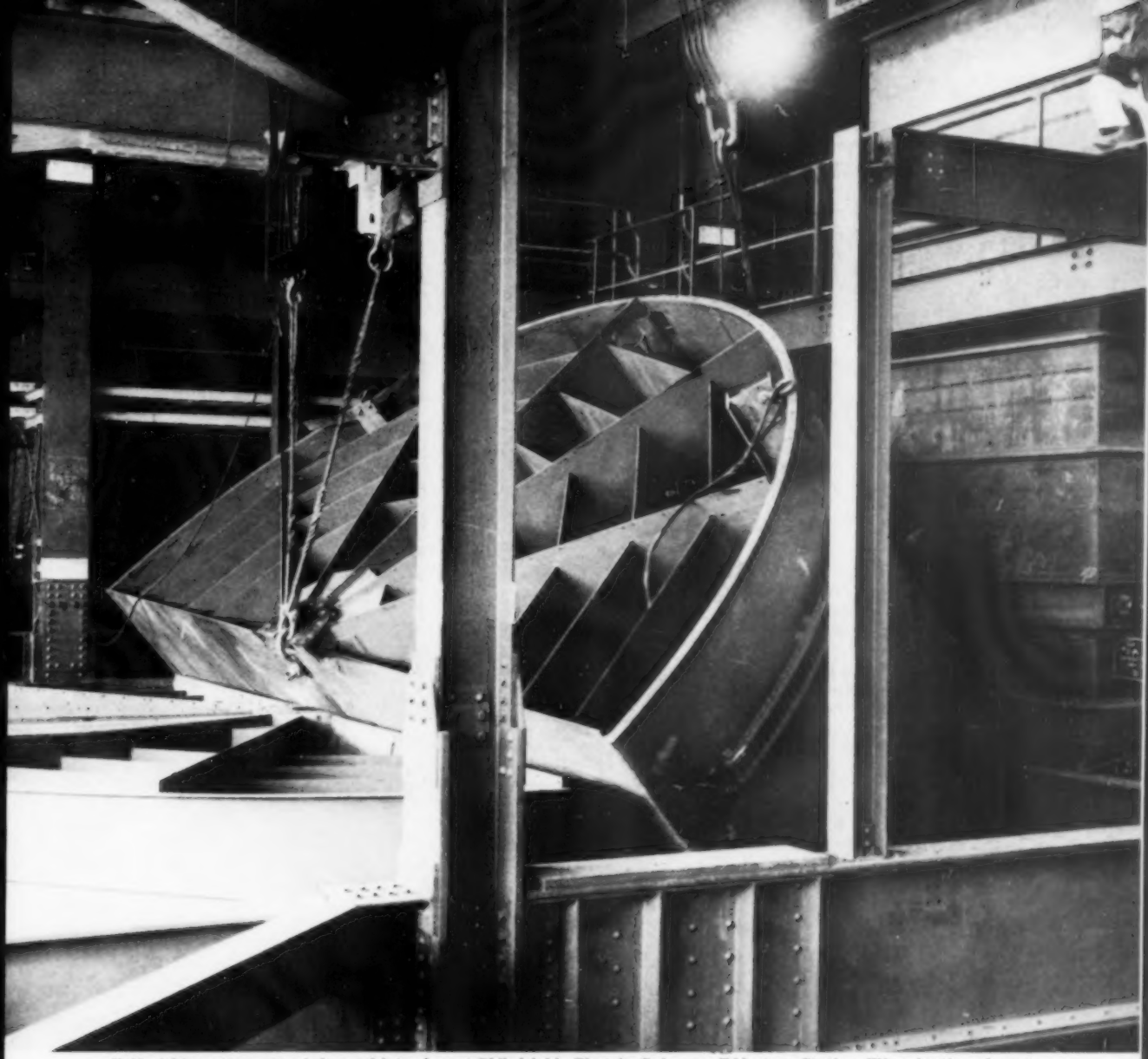


Half of Ljungstrom rotor is lowered into place at Philadelphia Electric Co.'s new Eddystone Station. When heating element baskets are fitted into the rotor chambers, this unit will provide 201,100 sq. feet of heat transfer surface and will weigh about 535,000 lbs. It will be one of four air preheaters serving a 325,000 KW unit. Two such boiler units are presently being installed.

SAFEGUARDING EDDYSTONE'S **NEW LJUNGSTROMS®** **—LIFETIME AIR PREHEATER SERVICE**

Dependability is standard equipment in Philadelphia Electric Co.'s new Ljungstroms. Each unit is protected by Lifetime Air Preheater Service. That means that *throughout the life of each unit,* Air Preheater engineers make regular calls to inspect the Ljungstroms and keep them in top operating condition.

Air Preheater also shows lively, consistent interest in their *factory* service to customers. For example, when a midwest customer recently ordered emergency replacement elements, Air Preheater's traffic department investigated the cost, speed and control of all commercial shipping methods. In the circumstances, regular trucking would take too long, rail delivery was impractical, other methods prohibitively expensive.

So Air Preheater asked for authorization to ship the replacement elements aboard one of their own trucks. The result: the elements arrived a week in advance of the hoped-for date – and, thanks to Air Preheater's efforts, the customer made significant savings on transportation costs.

In addition to regular field service and fast, competent factory service, Air Preheater offers you over 35 years of experience in solving boiler and preheater problems. These reasons help explain why 19 of the 20 most efficient power stations in the U.S. are Ljungstrom-equipped.

THE AIR PREHEATER CORPORATION

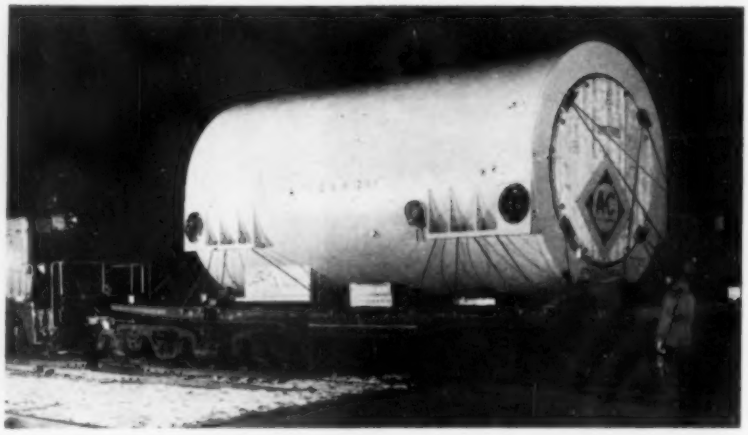
60 East 42nd Street, New York 17, N. Y.

Professional Engineers Nominate Hull, Houston

Noah E. Hull, vice-president and general manager of the Hughes Gun Company and assistant to the vice-president, manufacturing, of the Hughes Tool Company, has been nominated for the office of president of the **National Society of Professional Engineers.**

Mr. Hull, of Houston, Texas, is currently serving as National Society vice-president for the Southwestern Region. Mr. Hull has long been active in the San Jacinto Chapter of the Texas Society of Professional Engineers, and he is a former chairman of the Professional Engineers Conference Board for Industry.

The six regional vice-presidential nominees for the administrative year which begins in July, 1960, include **R. King Rouse,** Greenville, S. C., Southeastern Region; and **Thomas T. Mann,** Roswell, New Mexico, Southwestern Region. **Russell B. Allen,** Silver Spring, Md., was nominated for the office of treasurer.



Heaviest Single Allis-Chalmers Shipment Goes to Houston

Bound for the T. H. Wharton station, **Houston Lighting & Power Company,** is this 250-ton generator stator, heaviest single shipment ever made from **Allis-Chalmers'** West Allis Works.

Because of the stator's weight and height of almost 18 feet from the rails, the special steel decked flatcar was restricted to a speed of no more than 25 miles per hour.

The generator is for the 220,000-kw Unit 2 at the utility's outdoor power plant north of Houston.

L. D. Betz

J.R.C. of A.S.M.E. Elects

At the December 1959 meeting of the Joint Research Committee on Boiler Feedwater Studies, the following officers were elected to two year terms: Chairman — **L. Drew Betz,** President of Betz Laboratories, Inc.; 1st Vice-Chairman — **R. A. Lorenzine** of Foster Wheeler Corporation; 2nd Vice-Chairman — **J. D. Ristroph** of Virginia Electric Power Company. The J.R.C. is a Research Committee of A.S.M.E., whose purpose is the organization and prosecution of funded research on problems involving the use of water in power and steam generating systems.

$6,000,000 B&W Boiler for Baltimore Gas & Electric

The **Babcock & Wilcox Company** has reported receipt of a contract for more than $6-million to manufacture and install a Cyclone furnace fired radiant boiler to serve the second turbine-generator unit in the **Baltimore Gas and Electric Company's** new Charles P. Crane Station, near Chase, Md. The first unit, now under construction, is expected to begin operating about mid-1961.

Designed for a pressure of 2775 psi and to operate at a pressure of 2475 psi at the superheater outlet, the boiler will supply 1,360,000 pounds of steam per hour to the throttle of a nominally rated 183,000 kw turbine at a pressure of 2400 psi and a temperature of 1050 F, and will reheat the steam to 1000 F.

The unit will be equipped with four Babcock & Wilcox Cyclone furnaces. These will develop a heat input of 1,741,000,000 btu's per hour while burning 129,000 pounds of bituminous coal. A semi-outdoor installation, this second boiler is scheduled to go on-line early in 1963.

Computer Saves for VEPCO

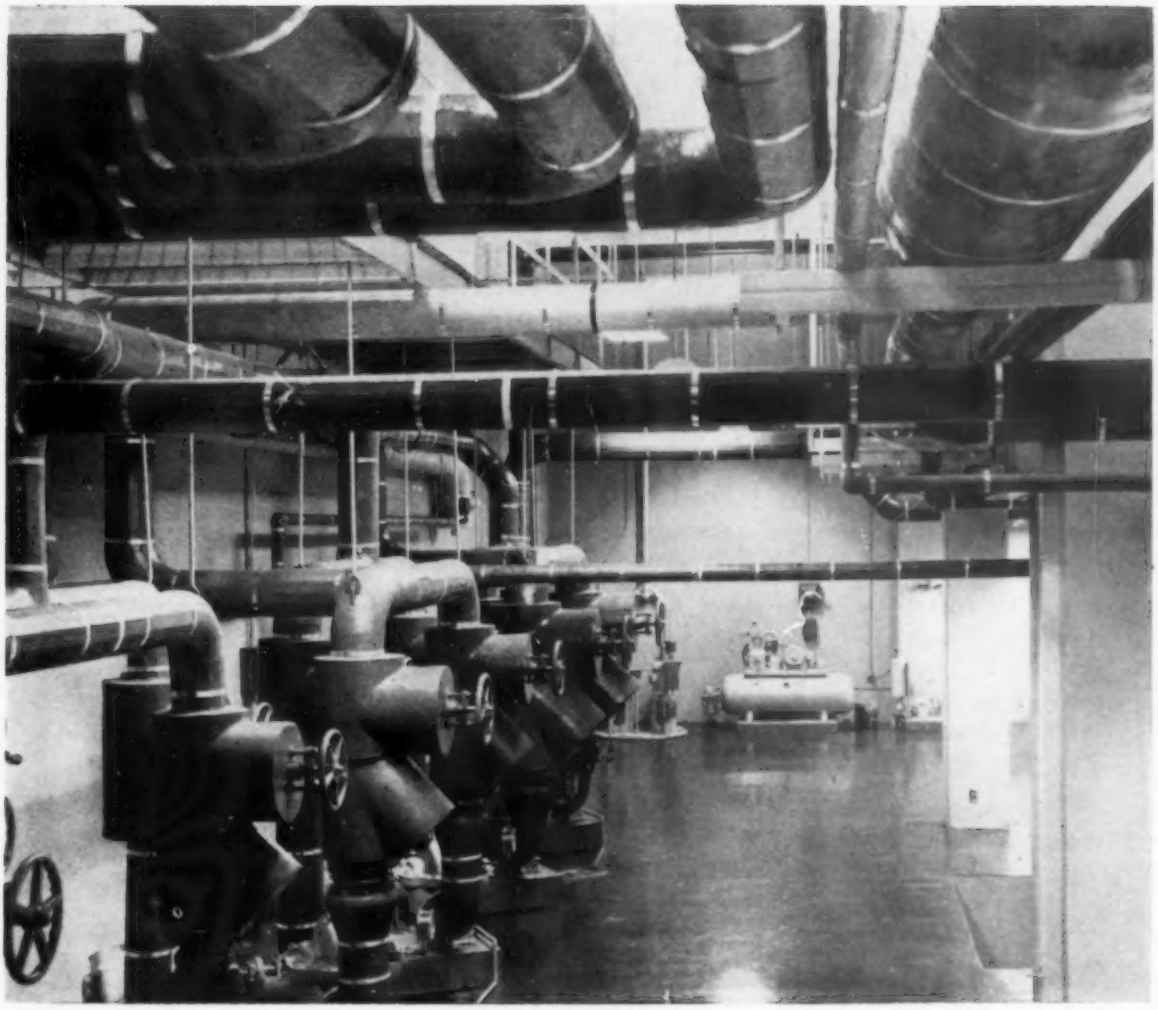
An electronic computer, designed to control instantaneously the system-wide electrical generation of the **Virginia Electric and Power Company,** has been installed at Richmond.

The computer and its associated equipment, costing approximately $125,000, will save the company an estimated $60,000 annually in the cost of producing and transmitting electricity. Among the first of its type in the United States, it was designed specifically for Vepco.

The computer figures transmission losses in Vepco's 2,245 miles of high voltage lines, cost of fuel and generating efficiency and then mathematically determines each station's share of the necessary load to meet customer demand. This calculation makes it possible for power to be supplied to the system distribution network at the lowest possible cost.

In addition to the master computer at Richmond, auxiliary computers are located at each generating station to keep production cost at each station to a minimum.

(*Continued on Page* 66)



Sure it's neat—but how can you tell it's safe?

The product tells you it's safe—USS National Seamless Steel Pipe and Tubes. The designer who insists on USS National Seamless is taking no chances. He wants to safeguard life and equipment, and to stop shutdowns because of unexpected failures.

Seamless shuts out all doubt. From end to end, it's one continuous piece of highest quality steel. No welds. No weaknesses. Absolute uniform wall strength. What's more, when a solid billet of steel is pierced, it's also critically explored. If the billet is successfully pierced, then every inch of the pipe is structurally sound.

Little wonder, then, that for industrial uses involving particularly severe or hazardous service, the first choice of engineers is seamless—in many cases, the use of seamless pipe is mandatory.

Remember this! USS National Seamless has ample ductility to permit bending, coiling and all other manipulations. USS National Seamless is not only the safest, but also the easiest to work with.

National Tube manufactures seamless pipe and tubes in a complete range of steel analyses from low carbon through the alloys up to and including stainless steel, to withstand the highest pressures and temperatures. A wide variety of sizes and wall thicknesses is available. Plan now to contact National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

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The world's largest and most experienced manufacturer of tubular products

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
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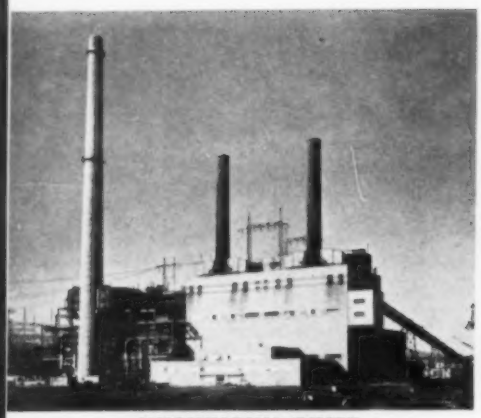
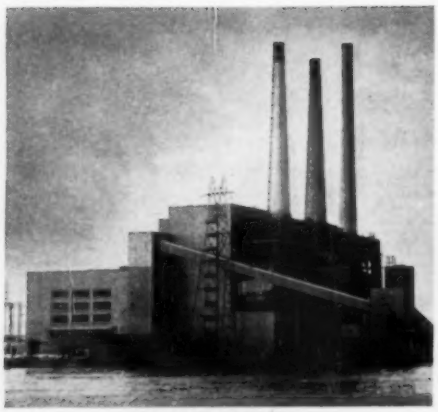


MUSKINGUM RIVER
9161 Btu/kwhr Ohio Power Co.
on the American Electric Power System
Two B&W Pressure-Fired Open-Pass Boilers and two Pressure-Fired Radiant Boilers



RIVER ROUGE
9160 Btu/kwhr
Detroit Edison Co.
One B&W Radiant Boiler
Firing 10% Blast Furnace Gas and 90% Coal

CLIFTY CREEK
9130 Btu/kwhr
Indiana-Kentucky Electric Corporation*
Six B&W Pressure-Fired Open-Pass Boilers

ALLEN
9178 Btu/kwhr
Duke Power Co.

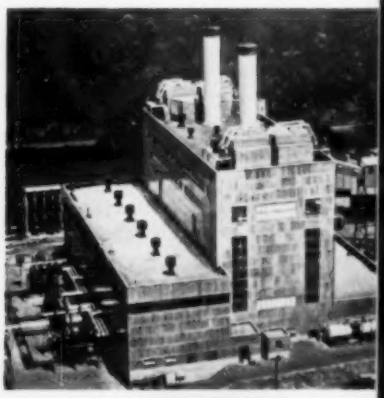
McMEEKIN
9093 Btu/kwhr
Part year, more than 6 months
South Carolina Electric and Gas Co.

KANAWHA RIVER
9143 Btu/kwhr
Appalachian Power Co.
on the American Electric Power System
Two B&W Pressure-Fired Radiant Boilers

BAY SHORE
9233 Btu/kwhr
Toledo Edison Co.
One B&W Radiant Boiler

TANNERS CREEK
9209 Btu/kwhr
Indiana & Michigan Electric Co.
on the American Electric Power System
Three B&W Pressure-Fired Radiant Boilers

KYGER CREEK
9166 Btu/kwhr
Ohio Valley Electric Corporation*
Five B&W Pressure-Fired Open-Pass Boilers



SHAWVILLE
9163 Btu/kwhr
Pennsylvania Electric Co.
Two B&W Radiant Boilers

FOR FIFTH CONSECUTIVE YEAR

B&W's Engineering Leadership Proved in Nation's Most Efficient Power Plants

It's the same story, year after year; most of the stations reported "best heat rate stations" by the Federal Power Commission are equipped with B&W Steam Generators. In the past five years . . .

1958 — 8 out of 10 "most efficient"
1957 — 8 out of 10 "most efficient"
1956 — 9 out of 10 "most efficient"
1955 — 7 out of 10 "most efficient"
1954 — 7 out of 10 "most efficient"

The "why" of this leadership is a pace setting research and development program that has given the power industry such innovations as gas tempering, the Universal Pressure Boiler, pressure firing, the Cyclone Furnace, and the Cyclone Steam Separator that makes natural circulation practicable in the highest pressure subcritical boilers.

B&W works closely with the Electric Utility industry helping to meet, often anticipating, their needs. In this way electric utilities and their suppliers can continue to fulfill their vital role in American growth. The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

B&W

THE BABCOCK & WILCOX COMPANY

BOILER DIVISION

G-959-C5

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(a) Subsidiary of American Electric Power Co. (b) Subsidiary of The West Penn Electric Co. (c) Subsidiary of Ohio Edison Co.

INDUSTRY SPEAKS

The Engineer—A World Diplomat

AN INDUSTRIAL leader experienced in East-West contacts has called attention to need for further efforts by private citizens to reduce tensions — especially engineers "Who speak the same language all over the world."

Individual efforts, not money, governments or diplomats alone, can help correct the imbalances that threaten civilization, said Walker L. Cisler, President of The American Society of Mechanical Engineers and of the Detroit Edison Company. He told his fellow engineers at the Society's Annual Meeting that well-qualified private citizens, such as engineers, must assist other nations with their problems of economic development. His talk was the Roy V. Wright lecture, an annual highlight of the ASME annual meeting.

"Engineers are trained to apply technology to solve the basic causes of human want and can aid the millions who in some nations keep themselves alive through work that is tragically unproductive by our standards."

Mr. Cisler described his own experiences in helping to thaw the climate of relations between the United States and Russia during a recent visit there. "We found that the engineers and managers of the Soviet electric power projects were very helpful, answering our questions fully. We were taken into areas of the country where our own diplomats have not been permitted to travel — and I think we had this freedom because we came as private citizens and had shown a willingness to meet them on a common basis.

"I was invited to the Kremlin, where I had separate visits with Deputy Ministers Anastas Mikoyan and Frol Kozlov, who expressed their appreciation for the hospitality that I, among others, had shown them on their visits to the United States. And it was clear that their visits had had an important bearing upon the exchange of visits between President Eisenhower and Chairman Khrushchev."

Mr. Cisler continued, reporting a conversation he had with Minister Frol Kozlov. Mr. Cisler said, "We are both engineers and we know something about the tremendous forces of energy that can be used today for constructive or destructive purposes."

Mr. Kozlov replied, "Yes, I know, and we must do something about it. We must find the way to keep these great forces from being used for destruction. There is so much that can be accomplished if we will only build and produce in peace."

According to Mr. Cisler, they discussed rather seriously how we might go about building an electric power plant combining the best of American and Soviet engineering, and to locate this in an underdeveloped country such as India.

"I am sure," he continued, "that there was sincerity in what we had to say on the matters we discussed and that they realize too the importance of peace to the great work needed in their own country to improve housing, roads and many other things. Both Ministers Mikoyan and Kozlov said they hoped that those of us who had gained a firsthand understanding of the Soviet Union would continue to take part in the building of better relations between our two nations . . . ."

But how will the engineer who has a responsible position find the time to lend assistance in other parts of the world?

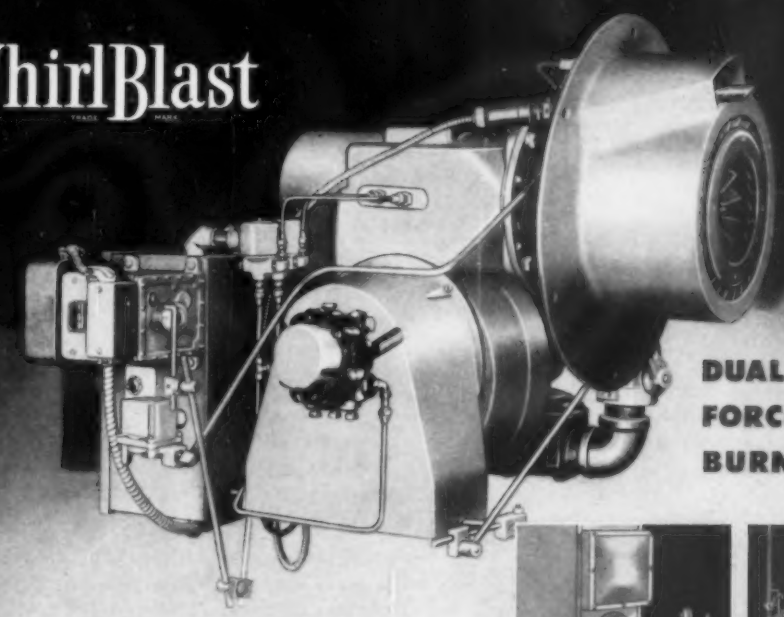
This is a problem and a sacrifice, Mr. Cisler admitted, but he added "with the use of modern transportation and communication an engineer who is accustomed to working long and uncertain hours can accomplish a great deal in another part of the world and return to his regular duties in less time than we would devote to a routine vacation.

"I believe that from the point of view of the employer, the time is well spent because of the need for such international endeavors, as well as for the experience that an engineer brings back with him."

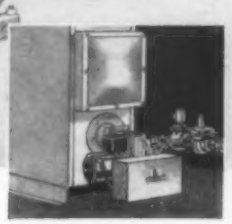
Summing up, Mr. Cisler said, "If those of us who are in a position to help to develop understanding and productive relations between nations fail to do this, then I can see little hope for maintaining peace and stability in this uneasy world."

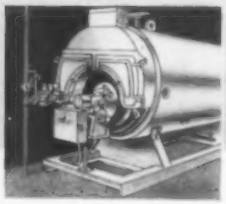
A new development by Iron Fireman

WhirlBlast



DUAL FUEL FORCED DRAFT BURNER





Makes firebox boilers super-efficient

NO SMOKE

Burns clean in less than 10 seconds. The WhirlBlast flame is brilliantly clean almost instantly, and stays clean. Although accepted standards of oil firing allow a 15 minute warm-up period, during which time smoke is tolerated, the Iron Fireman WhirlBlast burner is clean in seconds. Smoke and soot are unburned fuel—completely wasted by smoky starts.

NO STACK

Needs only an exhaust vent. Boilers with conventional burners require from 30 to 80 feet of stack or an induced draft fan. Sealed steel firebox boilers with WhirlBlast burners require only a small exhaust vent.

CONSERVES BOILER HEAT

Standby loss is almost nil. The highly efficient WhirlBlast burner does not need a refractory combustion chamber to "support combustion." Consequently there is no brickwork to store heat to be wasted during "off" periods. Standby heat loss is reduced to an insignificant minimum.

CUTS COSTS

Low fuel bills; low maintenance. Efficient combustion and low standby loss conserve fuel. Elimination of smoke and soot means no fouled boiler tubes, no carboned nozzles or electrodes; no refractory maintenance expense.

A COMPLETE PACKAGE

No special skill to install, adjust, service or operate. The WhirlBlast burner (for gas, oil or dual-fuel combination) comes from the factory fully wired and tested. Bolts to boiler front with firing head through fire door. No special combustion chamber or firing pit needed. Exceptional installation saving.

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AUTOMATIC FIRING EQUIPMENT
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TIMELY COMMENTS

Developments in Metalworking and Metallurgy

THE DEMANDS of space travel, economics, and a desire for general product improvement have effected developments in metalworking and metallurgy during 1959, according to a year-end report prepared by the staff of the American Society for Metals, and released by Allan Ray Putnam, managing director. Steel imports together with metalworking efforts to combat rising operational costs shared the year's spotlight with metals that float and steel made directly from iron powder.

Foamed metal, now brought out commercially, weighs as little as one-tenth that of a similar object of solid metal. A bowling pin of foamed aluminum will float in water.

The foaming is the result of mixing a chemical with the molten metal which acts, for example, as baking soda in bread dough. Foamed metals are used in aircraft and other structures needing strength with a minimum of weight. Future uses of the metal are said to be boat hulls, building panels, and for road surfacing.

Attention was drawn in the report to the so-called *rare earths* (not rare at all, only hard to separate in their native state) with the emergence of yttrium which has weight comparable to aluminum and a structure similar to titanium. It also has a low nuclear cross section that makes it of interest in the nuclear energy field. At present, yttrium is expensive but lower costs are foreseeable in the near future.

Appearing of promise for the lightweight radiation shielding of nuclear aircraft and space vehicles are gadolinium and europium. *Rare earths*, according to the ASM report, are finding uses in optical glass, high temperature batteries, thermoelectric power sources and rocket fuels.

Production of steel sheet and strip without blast furnaces, open hearths or other melting equipment, has proved practical in pilot plant operations. The innovation calls for the pressing of iron powder into a semi-solid strip and heating it to 2200 F in a special atmosphere, passing it through hot strip rollers. A saving of 40 to 50 per cent in equipment costs is indicated.

Vacuum degassing, using helium, is improving steel production with the passing of the helium through the molten metal that has been placed at 3000 F in a vacuum chamber. The injection of the helium hastens removal of certain gases to give a cleaner, stronger steel.

A new high nickel alloy, Rene 41, has missile potentials because of its capacity to take heat of 1800 F and the fact that at 1400 F it provides a strength of 120,000 psi. It has strength-to-weight ratios superior to other metals that might be used.

A new day has dawned for lead. By introducing certain metal powders into the molten lead new properties are imparted — such as higher tensile strength, as much as 1500 psi as compared to 300 psi for pure lead, is possible. A large number of metals can be mixed with lead to provide a versatile list of new characteristics.

Coating steel and other metals with aluminum will aid the war on corrosion. A method of vapor coating now puts an aluminum surface of 0.004-in. thickness on a base, the Metal Society report reveals. The new method is expected to have wide automotive and aircraft acceptance.

Composite materials made major advances in 1959 as did beryllium which holds great promise for use in the aircraft, missile and nuclear energy field.

Exotic methods of joining metals utilizing plasma jets, electron beams and ultrasonic generators have been perfected and are being used on an ever widening basis.

Who Discovers the Discoverers?

"A professor can never better distinguish himself in his work than by encouraging a clever pupil, for the true discoverers are among them, as comets amongst the stars." CARL LINNAEUS

Somewhere in this mighty land of ours, a gifted youth is learning to see the light of tomorrow. Somewhere, in a college classroom or laboratory, a dedicated teacher is gently leading genius toward goals of lofty attainment. Somewhere the mind of a future discoverer—in science, engineering, government, or the arts—is being trained to transcend the commonplace.

Our nation has been richly rewarded by the quality of thought nurtured in our colleges and universities. The caliber of learning generated there has been responsible in no small part for our American way of life. To our college teachers, the selfless men and women who inspire our priceless human resources, we owe more than we will ever be able to repay.

Yet how are we actually treating these dedicated people? Today low salaries are not only driving gifted teachers into other fields, but are steadily reducing the number of qualified people who choose college teaching as a career. At the same time, classrooms are beginning to get overcrowded. In the face of this, college applications are expected to double by 1967.

This is a severe threat to our system of education, to our way of life, even to our very existence as a nation. Our colleges need help—and they need it now!

HIGHER EDUCATION
KEEP IT BRIGHT

If you want to know more about what the college crisis means to you, and what you can do to help, write for a free booklet to: HIGHER EDUCATION, Box 36, Times Square Station, New York 36, New York.

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Sponsored as a public service, in cooperation with the Council for Financial Aid to Education

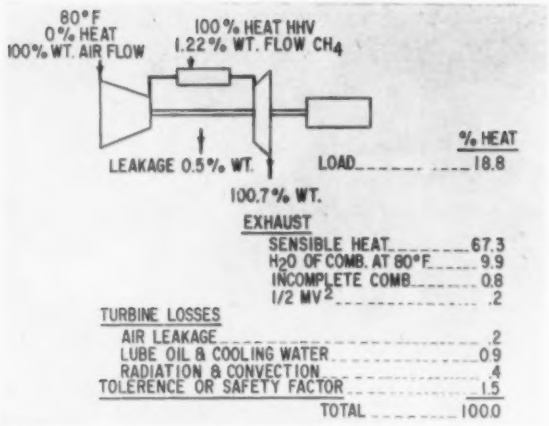
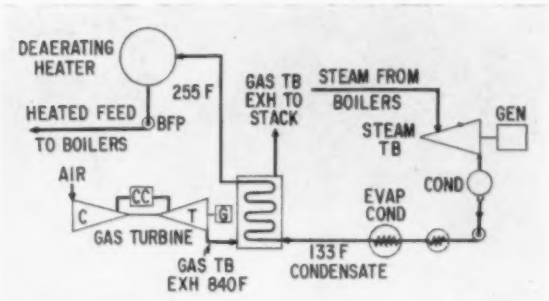


Fig. 1. (Left) Typical gas turbine heat balance.

Fig. 2. (Below) Gas turbine exhausting into feedwater heater of West Texas Utilities Co. plant.



Process Industries Can Save Money With Gas Turbines

ENGINEERS in the area served by SPI are particularly interested in the gas turbine because of the heavy concentration of processing plants in the area and the ample supply of suitable fuel for their operation. Furthermore, even the Southeast cannot afford to squander its water supply, and the Southwest already needs to economize.

By I. G. RICE
Application Engineer
General Electric Co.
Dallas, Texas

THE ACCEPTANCE that industry has already accorded gas turbines gives ample evidence of their reliability and usefulness. This relatively new driver can now be considered a dependable prime mover, offering the process industries another useful tool. An ever increasing variety of sizes and speeds are becoming available. Properly selected gas turbines can in many instances perform certain services better, improve over-all economy, or enhance the operation of other equipment.

Therefore, let us examine the useful products of the gas turbine on a broad basis. In doing so, suggestions will come to light as to how this new implement can be used and evaluated.

As a starting point, let's divide the available gas turbine products into the following three general categories.

I—Mechanical and Electrical Power

II—Highly Preheated Exhaust Gas for Waste Heat Recovery

III—Compressed Air for Special Processes

Each topic can now be dealt with separately and progressively integrated into various combined systems.

I—Power

The gas turbine constitutes a compact package. No boiler is required. Condensers and large cooling towers are eliminated, and extensive water treating facilities are not necessary. Immediately, a savings in equipment and real estate is apparent, offsetting the cost of the gas turbine that might initially appear high.

Because of the above equipment reduction, the gas turbine package affords several unique money-saving features:

1. Low cooling water requirements
2. Few associated auxiliaries
3. Low operation cost (Can be remotely operated)
4. Low Maintenance ($1.50 per hp-yr)
5. Fast Installation (7500 hp SC-1S: 2 to 4 weeks)
6. Low installation expense (Simple foundation and housing)

As for Item 1, in many areas of the country water make-up can amount to a sizeable operating expense. Even though fuel consumption does take the limelight, water is becoming a more important factor each year and should not be overlooked.

The inherent dependability of rotating equipment, coupled with a minimum of auxiliaries, adds up to low maintenance. The other two items (fast installation and low installation expense) also offer

potential savings but will not be elaborated upon here.

Most of the gas turbines that have been installed by the process industry utilize waste heat recovery equipment. Nevertheless, instances arise where no process heat is needed. Under such circumstances, the gas turbine can be applied to advantage in many operations even without any waste-heat recovery.

There are one-shaft gas turbines and two-shaft gas turbines, with simple and regenerative cycle versions. Generally, a single-shaft gas turbine has ample speed flexibility for most process applications. To further increase this flexibility and combat the inherent 5% power loss per 10 F increase in ambient temperature, it is possible to directly couple the starting turbine and run it continuously.

Where extreme flexibility is required, the two-shaft unit is available at a slight increase in cost. However, a single-shaft unit is preferable for a generator drive where a constant speed is encountered.

The simple cycle mechanical drive turbine efficiencies range from 18 to 21% (HHV) burning natural gas fuel. These efficiencies at first appear low, but there are presently low pressure condensing steam turbines being placed in service with efficiency levels no higher than these values.

For the regenerative cycle gas turbines, efficiencies of approximately 26% (HHV) are obtainable. Where the price of fuel is high, the added cost of the regenerator may be justified.

II—Exhaust for Heat Recovery

At the present stage in the art of designing and manufacturing commercial gas turbines, the expansion inlet temperature is limited to about 1450 or 1500 F. Therefore, in order to keep the temperature down to this level, a considerable amount of excess air (around 400%) is mixed with the high-temperature primary flame in the combustion chamber to temper the mixture to 1450 F to 1500 F.

This excess air has quite an effect on cycle efficiency, but before proceeding, a heat balance of a typical simple cycle gas turbine will give an insight into where the heat is distributed. Fig. 1 presents a breakdown of the heat, air, and fuel flow in terms of percentages.

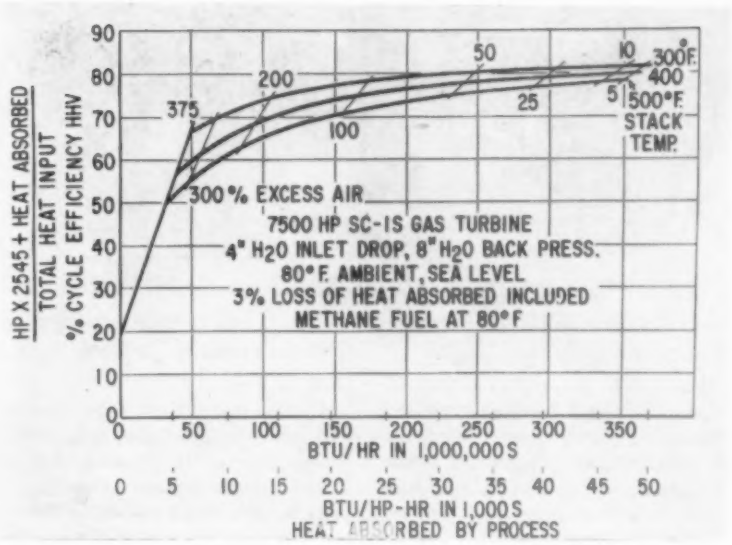


Fig. 3. Estimated gas turbine heat recovery cycle efficiency.

Running through the cycle, 18.8% of the heat is delivered as mechanical work. The majority of the remaining heat is rejected in the exhaust. Of this heat, 67.3% is in the form of sensible heat, 9.9% results from the water of combustion which is fixed by the type of fuel being burned (methane, in this case), and 0.2% appears as velocity energy. A figure of 0.8% has been included as incomplete combustion, but field tests show that in reality the combustion efficiency for natural gas fuel is practically 100%.

Then, observing the total mechanical losses, it can be noted that about 1.5% of the energy is rejected as air leakage, lube oil, cooling water, radiation, and convection losses. Finally, a tolerance or safety factor of 1.5% has been included to complete the balance which in reality would show up either as exhaust heat or less fuel input.

The heat balance represents full load and the various figures will change slightly for different operating conditions. However, the interesting point is that the mechanical losses will remain in the order of 1.5% to 2.0%. Thus, the gas turbine can be thought of as a hot-air generator producing both mechanical work and high temperature air.

Exhaust Gas Analysis

The gas turbine exhaust temperatures range from 800 F to 900 F, depending upon the turbine design and operating conditions. The exhaust gases contain approximately 400% excess air, and include about 80% of the original oxygen content of air.

The hot turbine exhaust gas can readily be used. For example, steam can be generated directly from the sensible heat in an unfired waste heat boiler. The heat can also be used for feedwater heating to advantage in certain cases to increase the steaming capacity of existing boilers and to improve over-all plant efficiency (Fig. 2).

The sensible heat can also be used for low pressure process steam generation or used directly to heat oil or chemicals. On the other hand, because of the abundance of oxygen and high temperature, the exhaust gas can be supplementary fired and used as combustion air in process heaters and boilers.

Cycle Efficiency

In evaluating the gas turbine and waste heat recovery, credit should be given to both the mechanical work performed and the

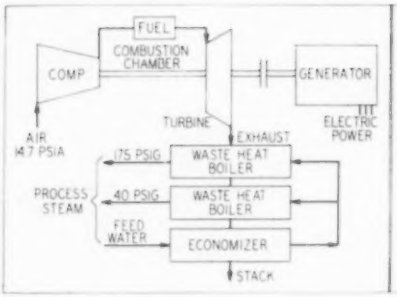


Fig. 4. Gas turbine exhausting to waste heat boiler.

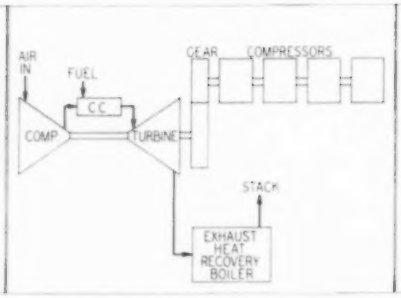


Fig. 5. Gas turbine driving four compressors in tandem.

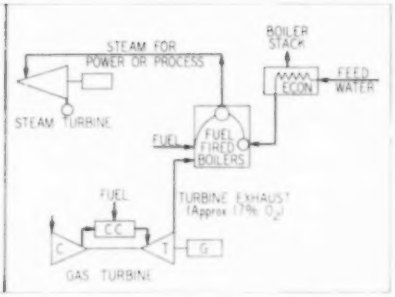


Fig. 6. Combined gas turbine and steam turbine plant.

amount of heat absorbed by the process. Then a cycle efficiency can be obtained and defined as the useful energy output (mechanical work plus heat absorbed) divided by the total heat input.

The graph, Fig. 3, shows what happens to the cycle efficiency from no supplementary firing to full supplementary firing. The cycle efficiency as previously defined is plotted against the heat absorbed by a process for various stack temperatures.

Excess air lines are superimposed on the plot to indicate how much air or oxygen is left over for various conditions. A 7500 hp simple cycle single shaft gas turbine has been used as a basis for the graph. For zero heat absorbed, the cycle efficiency is that of the simple cycle gas turbine — 18.8%. As the sensible heat in the exhaust is converted to useful energy, the cycle efficiency improves.

For this type of straight waste heat recovery, the excess air remains constant at 375%. Considering a 400 F stack temperature, the cycle efficiency would be approximately 57% HHV with 40,000,000 Btu-hr being absorbed excluding 3% assumed as heat recovery equipment losses. Figs. 4 and 5 show schematics of such systems.

Returning to Fig. 3, when the exhaust gases are supplementary fired, the cycle efficiency will rise quite rapidly at first with a gradual flattening off until, at a minimum of 5 to 10% excess air, the cycle efficiency is comparable to that of a conventional boiler having the same stack temperature and excess air.

If the steam and power are both generated at the same efficiency as an industrial type conventional boiler or heater under consideration, then it is obvious that the gas turbine power is being obtained at a high topping efficiency of about 80%. When the 100% efficiency of 2545 Btu per hp-hr is divided by the 80%, a figure of 3180 Btu per hp-hr is obtained. Figs. 4 and 5 show diagrams of supplementary fired set-ups.

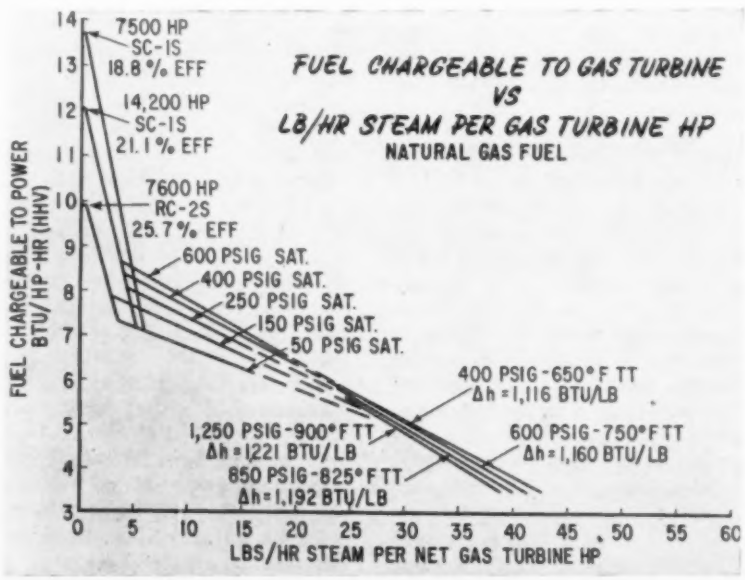
Example — Gulf Coast

A typical example of a gas turbine - boiler combination where topping power is being obtained from the gas turbine is a large Gulf Coast chemical plant where a General Electric 7000 hp simple cycle single shaft gas turbine drives a plant air compressor. The gas turbine exhaust is used as combustion air for a conventional boiler with an over-sized economizer substituted for an air preheater. The boiler produces 275,000 lb-hr of 1000 psig — 850 FTT steam which in turn feeds a topping steam turbine-generator.

The stack temperature obtained for this steaming rate is 370 F for a 240 F feedwater temperature. The oxygen content in the exhaust runs around 1.6% with zero per cent combustibles present in the stack. The stack temperature and excess air of the exhaust fired boiler thus compares favorably with typical industrial type boilers.

As an example of heat distribution, a heat balance for 10% excess air and a 350 F stack temperature shows:

Fig. 7. Fuel changeable to gas turbine vs. lb/hr steam per hp — natural gas fuel.



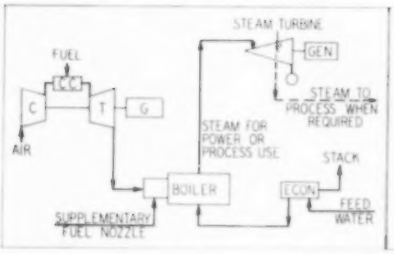


Fig. 8. Supplementary fired exhaust-heat recovery boiler.

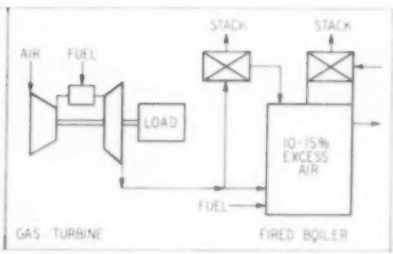


Fig. 9. Gas turbine and by-pass boiler recovery.

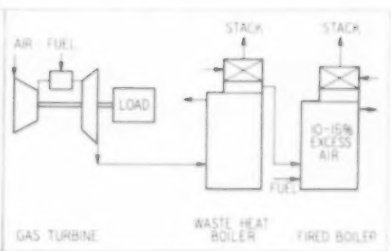


Fig. 10. Gas turbine with cascade recovery arrangement.

Fuel Input (HHV)

Turbine	23.2%
Boiler or Heater	76.8%

Heat Output Losses

Turbine Safety Factor and Losses	.6%
Boiler Losses	2.4%
Stack Sensible Heat	6.0%
Water of Combustion	9.9%

Output

Turbine Power	4.2%
Steam Output	76.9%

Cycle Effic. = 4.2 + 76.9 = 81.1%.

Although the graph (Fig. 3) was prepared for the 7500 hp SC-18 gas turbine, it can be used for other simple cycle turbines operating under similar conditions, by applying the Btu per hp-hr scale at bottom.

Fuel for Turbine Power

Another method of evaluating the gas turbine is given in Fig. 7. Here the fuel chargeable to gas turbine power is plotted against the ratio of steam flow per gas turbine horsepower. Steam conditions from 50 to 600 psig are shown on the graph for the lower ratios of steam to power. Pressures up to 1250 psig are included for the high ranges where it is profitable and practical to generate at these pressures to take advantage of topping steam turbine power along with the gas turbine.

Starting with no heat recovery, the simple cycle 7500 hp gas turbine has a heat rate of 13,500 Btu per hp-hr. As the sensible heat is recovered and credit is given for this heat at an 82% conventional boiler efficiency, the heat rate is reduced to about 8000 Btu per hp-hr depending upon the steam conditions. Supplementary firing the exhaust will further reduce the heat rate chargeable to the gas turbine to the 3180 Btu per hp-hr previously mentioned.

Multiplying the pounds per hour of steam per gas turbine horsepower by the enthalpy rise per pound of the feedwater will produce a comparable abscissa to that of Fig. 3. For instance, considering no supplementary firing and a 1000 Btu per lb feedwater rise for 150 psig steam, 5800 Btu per hp-hr of heat absorbed is obtained. This figure compares with a 350 F stack temperature and 5800 Btu per hp-hr of Fig. 3. Thus both curves are compatable and can be used together to estimate fuel consumption, heat absorbed, cycle efficiency, and fuel charged to power.

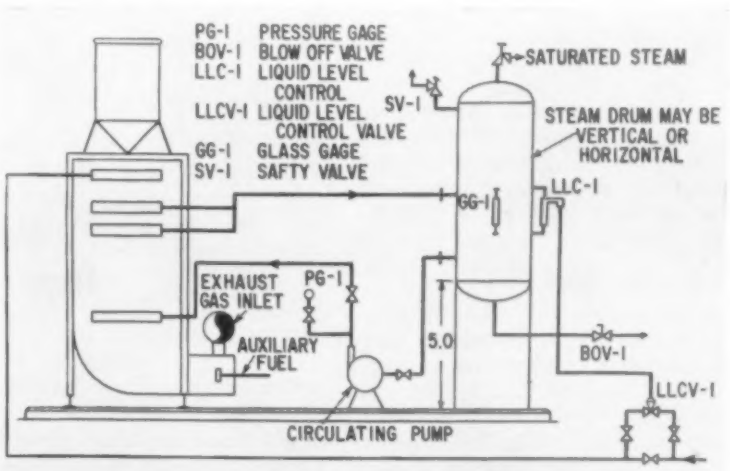
Types of Boilers and Heaters

A few words on the various types of heat recovery equipment available perhaps is of interest. Conventional water tube waste heat boilers can be adapted for supplementary firing (Fig. 8) where more steam at a higher temperature and pressure is required than can be obtained from a non-fired waste heat boiler.

In some cases, it is advantageous to use a by-pass boiler arrangement shown in Fig. 9. Here the excess air not needed for combustion is by-passed to a separate feedwater heater or waste heat boiler. The excess air can also be run to the boiler economizer. A large Gulf Coast chemical plant operates three gas turbines and three boilers of this by-pass arrangement.

Another system using conventional boiler equipment is also available such as shown in Fig. 10. Here a field erected or packaged boiler is tied to the end of a waste heat boiler to form a cascade arrangement. A twin set-up of such a system has just recently

Fig. 11. Steam generation system using turbine exhaust with auxiliary firing.



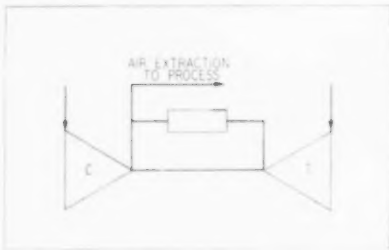


Fig. 12. Gas turbine air-extraction cycle for process.

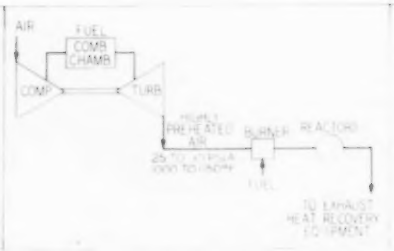


Fig. 13. Turbine supplying preheated air for process.

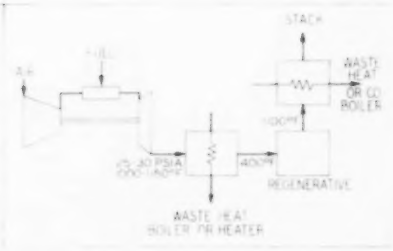


Fig. 14. Turbine supplying air for catalytic cracker.

been placed in service at another chemical plant.

Several heater manufacturers are presently offering extended surface packaged waste heat boilers that resemble heaters in appearance more than boilers. Some employ natural circulation and others use forced circulation.

A schematic diagram of a forced circulation system utilizing supplementary firing is shown in Fig. 11. Low back pressure penalties on the gas turbine in the order of 4" H_2O are being considered for these boilers. Although Fig. 11 is shown for steam generation, the system can also be used for various oil heates.

III—Air for Processes

The third category which weds the gas turbine to certain processes will now be touched upon. In such systems, the gas turbine is used as an air compressor, an expander, or as both.

Air Compressor

The first scheme that comes to mind utilizes a portion of the compressed air from the gas turbine as shown in Fig. 12. The air is bled off the compressor at the compressor discharge or at some intermediate pressure before the compressor discharge. In most applications this arrangement does not prove economically attractive because it is somewhat inefficient and inflexible.

Bob-Tailed Units

Another scheme of using the gas turbine as an air compressor, or better termed as "hot air generator," is shown in Figs. 13 and 14. Here, the power wheel is removed from the gas turbine and the energy that was available to do work is converted to hot air under a back pressure. This scheme is presently operating in the production of butadiene.

A natural application exists in the butadiene process, Fig. 13. Here the hot air at the 12 psig obtainable from presently designed commercial gas turbines fits the requirements. About 98% of the fuel input goes into the hot air. Practically all of the heat is then utilized and a separately driven air compressor is eliminated.

To further improve the butadiene process, the waste heat boilers could be replaced by supplementary fired boilers, thus reducing the excess air. Of coures, this is based on the premise that additional steam is required at the time the process is installed.

The back pressure gas turbine has been suggested to supply air for a cat cracket regenerator such as shown in Fig. 14. The hot gas from the gas turbine is passed through a waste heat boiler to lower the temperature to about 400 F before entering the regenerator. However, this scheme has not as yet been used.

Presently, designs for gas turbines use compressors of approximately 6:1 pressure ratios which limit the back pressure to about 12 psig. This pressure can be raised slightly by adding a booster steam turbine on the front of the gas turbine, but even so, the pressure might be somewhat low for this application.

Conclusion

Viewing gas turbines and their applications collectively, it is evident that a new tool is now available, a tool that has earned a place for itself in the process industry as a reliable, versatile, and efficient prime mover. Through its proper application, we can advance another step.

No Mashed Fingers

MANY buildings have steel doors equipped with steel handles as per attached sketch. Often the handles have been placed close to the edge of the door and when closing the door from the inside, it is easy to have the fingers caught between door and door jamb.

As a safety measure, we found that welding a plate across the handle, as shown by the shaded section in the sketch, makes it impossible for the fingers to protrude through the handle and therefore prevents any broken or damaged fingers.

By R. V. WILK, Supt., Day-Brite Lighting, Inc., St. Louis.

Note wood roofing over calender in processing area where corrosive vapors rise to ceiling.

Four-inch thick pressure-treated wood flooring was installed around bleach kiers and washers.

North Carolina Textile Finishing Plant Uses

Pressure-Treated Wood Roofs and Floors

ROCK HILL Printing and Finishing Co., Rock Hill, S. C., uses pressure-treated wood roof decking in three-inch thicknesses on about 500,000 square feet of building area.

J. A. Aycock, plant engineer, explained that in the processing areas pressure-treated wood is used to prevent rot. The treatment also makes paint stay on the surface better because the material does not hold moisture. The relative humidity is around 100 per cent at 100 degrees F often where the wood is used.

Said to be the largest textile finishing plant in the world, the company has 46 printing machines producing all kinds of material, and a large dyeing department handling both synthetics and cotton contribute to the high moisture content of the air in the plant.

In view of the large quantities of water vapor released in large sections of the plant during processing, it was almost impossible to prevent condensation on the roofs and ceilings in some areas of the plant. Caustic and acid fumes also contributed to the deteriorating effect of the atmosphere in the plant.

To assure long-lasting roofs, Rock Hill engineers specified pressure-treated wood, and the treated wood has proved effective in combating rot and leaching. Also, the cleanliness of the material is of importance in this application where humidity is high.

According to Mr. Aycock: "We have to use the best materials to combat the elements and have found that wood roofs are the most satisfactory for us for a number of reasons. There is a great deal of insulating value to wood which tends to reduce condensation," he said. The wet processing sections have one to two inches of various roof insulations on top of the roof deck upon which the built-up roofing is applied. Another reason why this mill prefers wood roofing is that changes are constantly taking place in improving ventilation and rearranging equipment which requires cutting holds through the roof for duct work, and wood is an easy material to cut and alter.

Other materials have been tried in a number of plant applications (such as flooring around processing equipment) with varying degrees of success, but none has been found equal to wood in this instance, Mr. Aycock concluded.

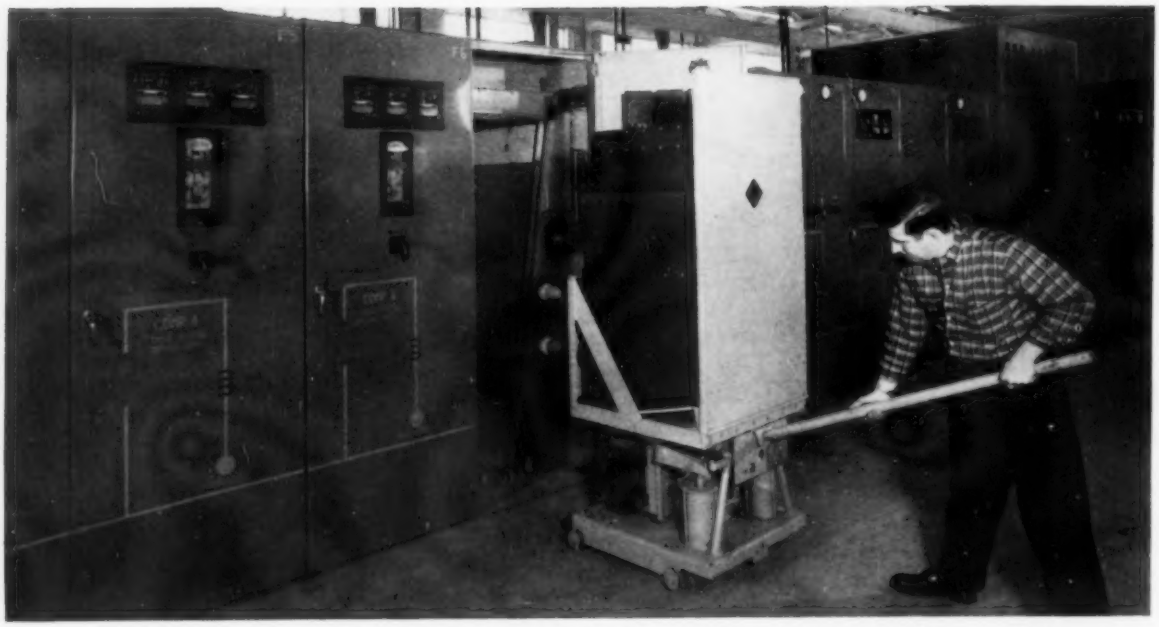


Fig. 1. Removable circuit breaker element being inserted in metal-clad switchgear cubicle.

The Trend Toward Single Large Automated Process Lines Calls for Bigger Motors That Must Not Be Allowed to Fail.

Better Motor Protection

By E. R. BRUCKLACHER
Switchgear Department
Allis-Chalmers Mfg. Co.

AS LEADERS in the *single large automated process approach* to efficient production, the Chemical processing industries have effectively reduced the number of units required for a given plant output.

Because of increasingly larger ratings of gas compressors, cooling water pumps and air blowers used, electrical drives, in the form of synchronous and induction motors, have also increased in size. Motors above 2500 hp are in common present day use.

Due credit must be given to outstanding developments in materials such as insulations and motor steels permitting bigger and better motors in the past 10 years — bigger applying to power and voltage rating, and better applying to efficiency and life expectancy.

A large motor applied to a process unit usually constitutes the major percentage of the total connected horsepower for the unit — the remainder consisting of numerous smaller machines. The main air blower drive for a fluid catalytic cracker unit is one such example.

In most cases, the large machine is so important that if its drive stops, the entire process must be shut down. Since many of the newer plants are operated as continuous process rather than batch process, a whole series of processes will be affected by a one-machine failure. Therefore the electrical enginer must design suitable control and switching schemes to protect this large capital investment, as well as to maintain process flow.

Along with the increased horsepower ratings of motors in recent years has come utilization of higher voltages and increased system short-circuit capabilities due to ties with various generating systems. These larger machines require larger and "stiffer" systems in order to accelerate their loads on starting. With these higher ratings certain previously adequate classes of starting equipment are ruled out.

Switchgear Application

For border-line applications a comparison may be made between industrial controllers and metal-clad switchgear and a choice made with economics in mind.

We assume herein that certain ratings have been exceeded. However, as a logical step let us review ratings of high voltage industrial controllers utilizing high inter-

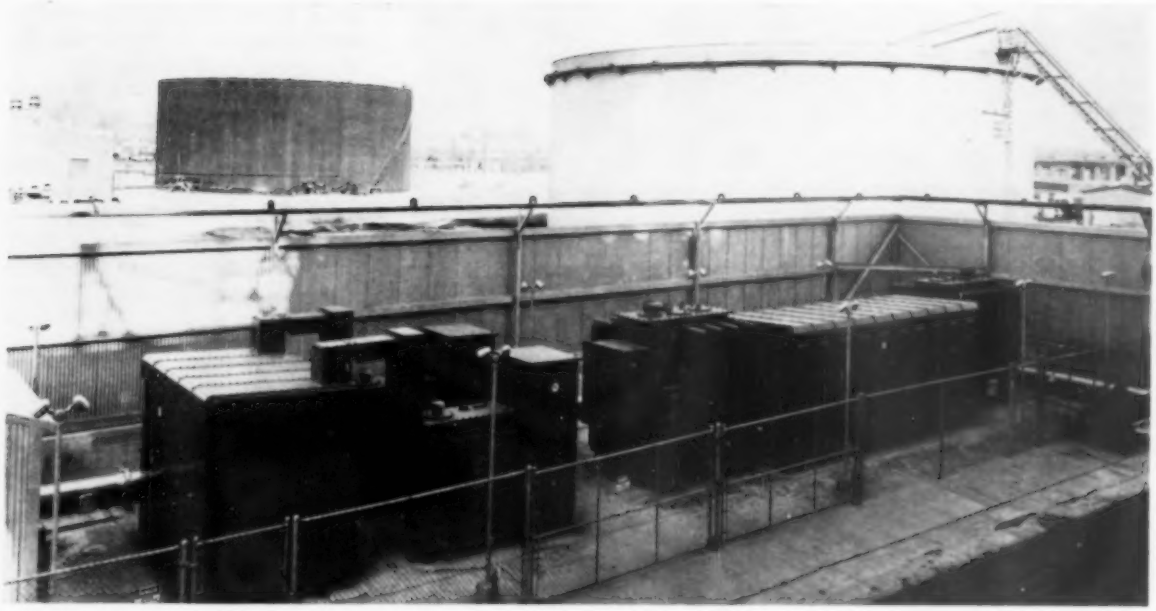


Fig. 2. Conventional outdoor switchgear in substation installation.

rupting capacity current-limiting fuses for short circuit protection up to 250,000 kva and 60,000 rms asymmetrical amperes.

Air and oil-type line contactors can be obtained for application to a maximum rating of 3000 hp and 5000 volts at unity-power factor for synchronous motors. Synchronous motors operating at 80 per cent power factor and induction motors rated up to 2500 hp at 5000 volts can be controlled by this class of equipment.

The horsepower limitations indicated above are due, in part, to the maximum full-load rating of 400 amperes of the contactor applied.

Metal-clad switchgear utilizing circuit breakers rather than contactors can be obtained rated 600, 1200, 2000, and 3000 amperes, permitting application up to approximately 7½ times the maximum horsepower ratings indicated above for industrial controllers.

This equipment is available for application at the nominal voltage range of 2400 to 13,000 volts with short-circuit interrupting capacity from 25,000 to 1,000,000 kva. It is noted that any application over 5000 volts or 250,000 kva will require metal-clad switchgear rather than industrial control.

Metal-clad switchgear is an assembly consisting of metal-enclosed units and auxiliary compartments characterized by the following salient features.

1. All parts are completed enclosed in grounded metal compartments.

2. The readily removable circuit breaker element allows speedy inspection, testing and maintenance (Fig. 1).

3. Automatic operation of the mechanically latched-in circuit breaker through the use of protective relays rather than fuses.

4. Interlocks and metal barriers provide safety to operators and minimize damage during fault conditions.

5. Main bus bars are completely insulated throughout.

Paralleling tremendous developments in motor winding insulation, switchgear manufacturers have vastly improved conductor insulations in recent years. Glass polyester and phenolic insulation with fire-retardant additives are available to provide: (1) low moisture absorption rate, (2) high arc-tracking resistivity, (3) high impact strength and (4) low time-temperature deterioration rate. All of these characteristics are most desirable in plants located in hot, humid climates.

It is desirable to position the switchgear as close as possible to the motor. However, location of standard metal-clad switchgear, as for example in a refinery, had been a major problem due to the classification of areas as to degree of hazard.

The recent API Standard RP-500 (API Recommended Practices for Classification of Areas for Electrical Installations in Petroleum Refineries) serves as a definite clarification and supplement to the National Electrical Code and provides detailed dimension sketches outlining areas for this industry.

Since special explosion - proof switchgear is both expensive and difficult to maintain, with RP-500 as a guide, the electrical engineer can now more surely lay out his system utilizing standard metal-clad switchgear of the indoor or outdoor type. Figure 2 shows an installation utilizing conventional outdoor metal - clad switchgear, while Fig. 3 illustrates an indoor installation located in a pressurized control room.

A recent development in outdoor switchgear design (Fig. 4) has made available a weatherproof housing allowing sufficient room in the breaker drawout aisle for breaker interchange, as well as maintenance. This eliminates the necessity of transporting the

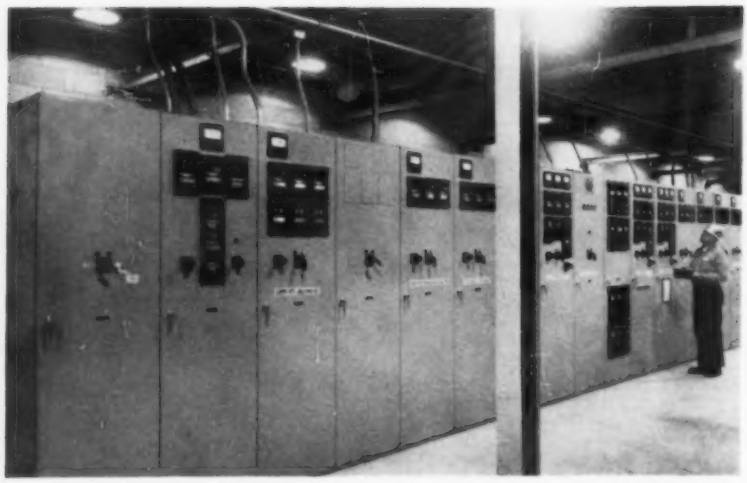


Fig. 3. Indoor 4160-volt main metal-clad switchgear installation in a refinery.

circuit breaker to a central maintenance "shack" and offers the opportunity of inspection during inclement weather.

Sufficient space for storage batteries and test devices is included. The overall floor plan of this "sheltered" construction is approximately equal to conventional outdoor switchgear with its breaker drawout pad requirements.

Motor Starting

Because of their application, many large process motors are started very infrequently. Some of these drives may run continuously for 300-500 days, being shut down only for scheduled maintenance periods. It is, therefore, usually possible to provide switchgear control for full-voltage starting. This method is desirable over any type of reduced-voltage starting because of simplicity of controls and lower cost.

When permissible power company starting inrush kva is slightly exceeded, arrangements have been made to start up during off-peak hours. Another solution is application of special design low kva inrush machines.

For some applications the driven machine can be provided with unloading devices, thereby reducing inrush. Where none of the above are possible, reactor or autotransformer reduced-voltage starting can be used. The additional starting and neutral breakers incur increased initial expense.

Fig. 4. Shelter-clad outdoor switchgear with common breaker drawout aisle. Note throats for connection to two transformers to complete double-ended substation.

Motor Protection

Protective relays, located on the hinged instrument panels, are an important component of switchgear operation and application. Cost of relaying has frequently been compared to premiums on an insurance policy. The higher the degree of protection, the higher the premium paid.

Choice of the complement of relays becomes a combination of economics and sound judgment. Loss of production due to motor repair down-time must be considered. It is the function of the protective system, first, to eliminate the possibility of motor damage, and secondly, to minimize the amount of damage.

The National Electrical Code and NEMA "Power Switchgear Assemblies Standard" lists a bare minimum for large motor protection. This, coupled with the tremendous range in size, speed, and insulation of motors, presents a problem in relay application.

These motor variables cause difficulty in evaluation of the thermal capacity and thermal time constants of a given machine. Motor heating curves, covering the full range of operation from locked rotor to full load, which are required for accurate protective measures, have not been readily available.

Thermal Protection

Thermal overload stator protection can be considered preventive, since it is the function of this measure to prevent the deterioration of insulation due to heat caused by overloading. If overloading is allowed to persist, insulation failure and down-time may occur.

Two basic types of temperature relays available are the replica type operated from current trans-

formers carrying motor current, and the winding temperature type actuated by embedded resistance-temperature detectors located in the stator winding slots. The second method is considered more accurate.

The replica relay assumes heating is due to motor current only. With detectors a scheme can be arranged to sound an alarm on sustained high temperature and, in turn, if not relieved, the motor can be shut down. The detector at the hottest spot is used for this purpose.

Stator winding protection is considered running protection. However, on starting, the rotor, rather than the stator, requires protection due to high starting current inrush. This is necessary since rotor bar end connections may be weakened due to excess heat.

As shown in Fig. 5, to protect against rotor damage, induction overcurrent relays are used to coordinate with the thermal relays to provide overall thermal protection. These overcurrent relays also protect the stator on severe overloads.

Instantaneous attachments can be obtained on both the thermal replica relay and the induction-type overcurrent for protection against fault and excessive overload conditions.

In some cases induction-type line overcurrent relays with long time characteristics are used for the larger motor overcurrent protection. These relays are supplemented by winding temperature relays and provide backup protection for the differential relaying if utilized.

Differential Protection

Differential protection is recommended by NEMA Standards (Power Switchgear Assemblies) for motors rated 2200 to 5000 volts, 1500 hp and above, and all motors over 5000 volts above 500 hp.

This scheme requires that current transformers be placed at each end of the motor winding, and the current entering be compared to the current leaving. The differential relay will be insensitive to inrush and high overloads, as well as single phasing, since there will be no unbalance of current in the given phase or winding.

Should a fault occur in one phase winding, a difference of current entering and leaving the motor exists, and the relay will operate to trip the starting breaker through a hand reset lockout relay. This lockout relay is utilized so that the motor will not be restarted accidentally with the faulted condition of the winding still existing.

Differential protection attempts to minimize the amount of stator damage, since a fault condition is required for relay operation.

Over Voltage Protection

To protect against starting a large motor on improper phase sequence or open circuit, a polyphase voltage relay is utilized to prevent closing the starting breaker. If the three-phase voltage drops below a predetermined value, this relay will function to trip the breaker.

Although it may be permissible to keep a motor energized on a temporary voltage dip, a prolonged outage may require disconnecting the motor completely. This prevents possibility of heavy inrush due to re-connecting at improper voltage angle.

This polyphase undervoltage and phase sequence relay cannot detect a single-phase condition while the motor is running. Sufficient voltage across the open phase will be produced by the motor to prevent relay operation.

Current Balance Protection

Under certain loadings, this single-phase condition would eventually be detected by the thermal relays; however, a faster means of detection is accomplished by the use of a current balance relay. This polyphase relay checks balance of the three line currents. Under single-phase operation the line currents will be unbalanced causing relay operation.

Synchronous Motor Protection

The protective relaying mentioned thus far is applicable either to induction or synchronous motors. However, because of the rotor construction of synchronous motors additional protection may be required. Some of these are field failure, damper winding and loss of synchronism protection.

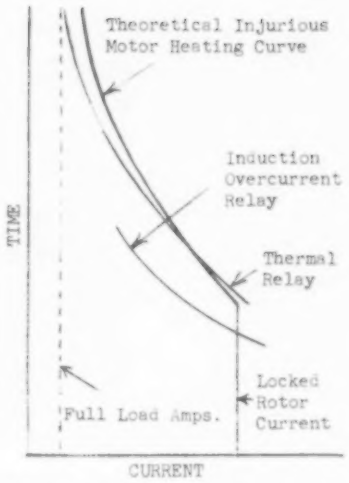


Fig. 5. Relay coordination to protect against motor heating.

Ground Detection

Where the distribution system serving the motor is ungrounded, drawout potential transformers with current-limiting fuses are connected wye-wye to the main bus. Ground detection voltmeters, indicating lamps or alarms are provided. This precaution is made to permit location and isolation of the ground fault before a phase-to-phase fault occurs shutting down the entire system.

Miscellaneous Devices

In addition to relaying equipment mounted at the switchgear, certain protective devices are mounted at the motor. Some of these are bearing temperature relays, zero speed switches and space heaters. The space heaters are energized during shut - down periods to prevent condensation of moisture on the windings. Machine surge protective devices must also be considered.

In review, large critical process motor protection and control with metal-clad switchgear can be readily justified. Since cost is constant for a given scheme of protection, the "premium" paid to protect a large costly motor is more economical than for a small less costly motor. Thorough study of machine and process is required to design a sound protective scheme.

Looking over work at the Francis J. Gannon Station are BARNEY SHEPPARD (left), assistant chief engineer of the plant, and C. L. THOMAS, JR., Gulf sales engineer. Working with plant engineers and consultants, lubrication engineers cut the total number of lubricants required for the plant to four oils and four greases.

Tampa Electric Company . . . . . Tampa, Florida

FOUR OILS and FOUR GREASES

ONE OF THE SOUTH'S most modern power generating plants, the Francis J. Gannon Station of Tampa Electric Company, Tampa, Florida, is being lubricated with only four oils and four greases.

To reduce the many lubrication specifications to this simplicity, according to Barney Sheppard, assistant chief engineer of the station, requires an intimate knowledge of lubricants and their application. The problems of lubrication, as he put it are this:

"Every piece of equipment coming into the plant requires some lubrication. Normally, the manufacturer makes recommendations, but these vary somewhat according to each manufacturer. If we were to follow all their specifications without making adaptions, we would need almost as many different greases and oils as we have pieces of equipment. But we found that the knowledge it takes to simplify this complex problem is available to us through lubrication specialists."

Shortly after Stone & Webster, consulting engineers, Boston, began construction of the facility Gulf Oil Corporation (with district offices in Tampa) was invited to make studies and recommendations for a complete lubrication program. The many varying requirements for lubrication of well over a hundred different types of equipment from soot blowers to turbines were studied by the engineers. As a result, the assistant chief engineer says they have had absolutely no trouble in this plant due to lubrication failure, even though shutdowns are anticipated in a plant when first starting.

The plant first began operating in August, 1957 when a 130,000 kw General Electric turbine generator was put into service. A second 130,000 kw generator was supplied by Allis-Chalmers. The plant will have six units of similar capacity when completed.

Of all the lubrication problems in a plant of this type, according to Mr. Sheppard, turbine generator oil is the most important. Turbine generators constitute the heart of any power plant, and as such, are the most expensive single items of equipment.

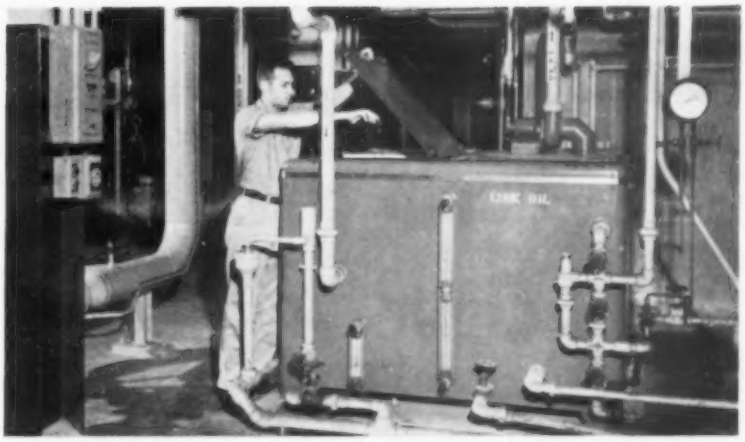
To lubricate the new turbine, Tampa Electric selected Gulfcrest 44. This turbine oil is processed through customary refining methods and then upgraded through the Alchlor process. This extra step in refining weeds out the harmful unstable hydrocarbons which remain after normal refining, according to Gulf's research chemists.

The Alchlor process derives its name from the use of anhydrous aluminum chloride. This chemical is mechanically agitated with the oil to be super-refined, and the resultant sludge is drawn off. The super - refined fraction, according to Gulf, is more stable and has a greater ability to benefit from suitable additives because its weak molecules have been removed.

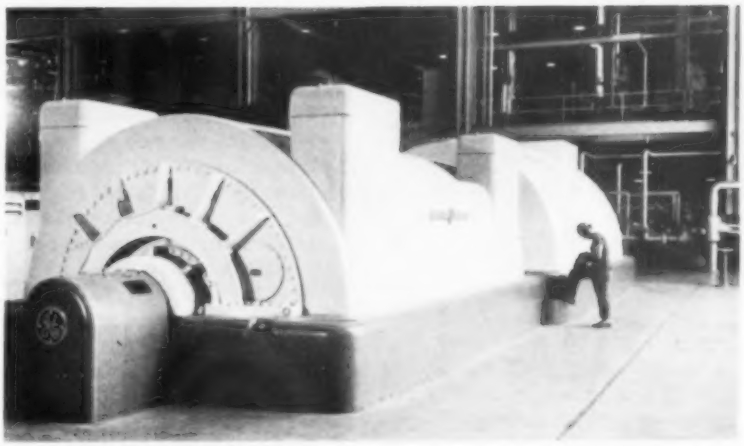
To make sure that the oil is living up to its reputation, Tampa Electric's maintenance schedule calls for taking hourly readings of steam temperature, steam pressure and temperature on all bearings. These readings are made from various gages on the turbine generator. Samples of the turbine oil are taken from Bowser filters every 30 days and tested in their laboratories. Periodically, samples of this oil are sent to Gulf laboratories in Philadelphia for further tests.

In making all of those checks on the condition of oil in the turbine the operators find that there is no foaming, sludge formation, or rust, and most important, neutralization numbers remain remarkably constant, Mr. Sheppard reports.

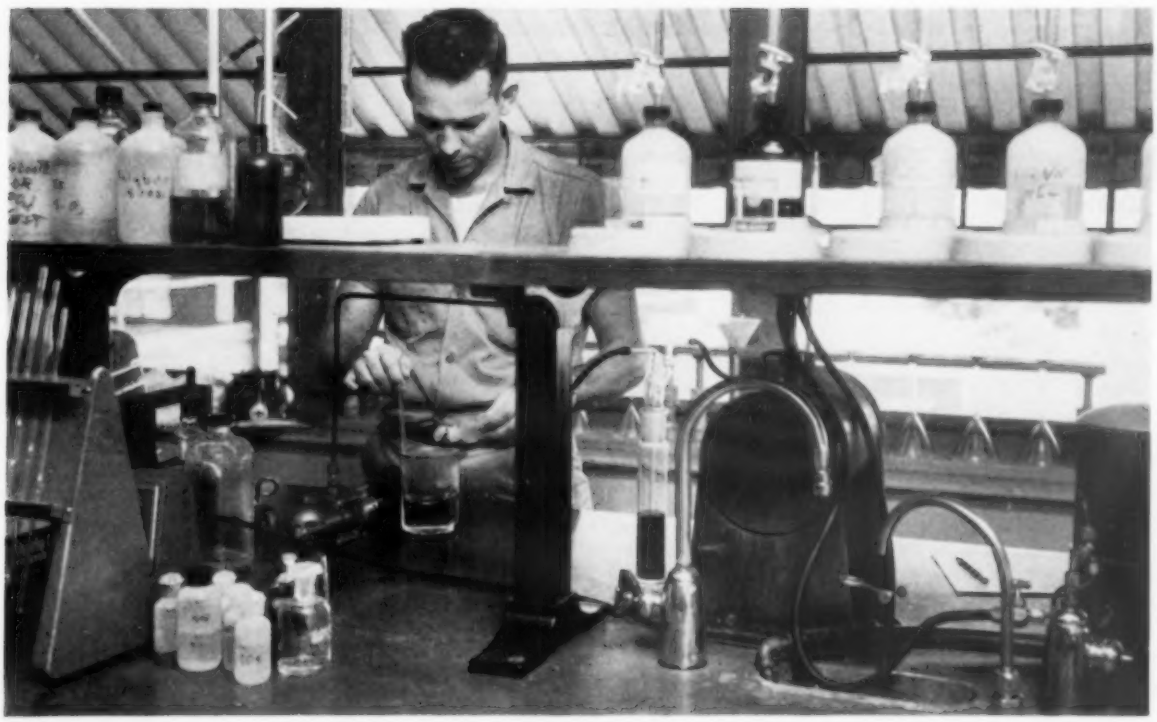
The laboratory technician is taking a sample of turbine oil from the oil conditioner to be tested for acidity. Such tests are made every 30 days. Hourly checks of lubrication performance are provided by turbine instrument readings.



This General Electric 130,000 kw turbine generator at the Gannon Station began operating in August of 1957. Five additional units of the same capacity will constitute the finished plant.



Taking turbine oil sample back to the lab, Chemist Jack Robinson runs test on oil for acidity. Engineers report that neutralization numbers on this oil remain stable.



Centrifugal Pump Clinic

QUESTIONS and ANSWERS Conducted for SPI Readers

By **IGOR J. KARASSIK**
Consulting Engineer and
Manager of Planning
Harrison Division
Worthington Corporation

QUESTION . . . . . .

WHAT PARTICULAR precautions are necessary in replacing gaskets for the split of axially split casing pumps?

ANSWER . . . . . .

IF ON OPENING the pump it is found that the gasket is in perfect condition and still adheres to the lower half of the casing, it is not necessary to replace it. On the other hand, if the gasket is damaged even slightly, a new gasket must be used. The new gasket should be of the same type of material as the old one and of the same thickness, so that it will be compressed to the same extent.

To understand the importance of using the correct gasket material, it is necessary to visualize what happens to the gasket when it is applied to prevent leakage at the casing flanges. When the pump is assembled and the flanges are pulled tight by the casing bolts, these bolts are given an initial stress in tension. The gasket itself is subjected to a compressive stress which is a function of the bolt stress and of the relation between the areas of the bolts and of the gasket.

When the pump is operating, the internal pressure increases and so does the bolt stress, so that the bolts increase in length. Assuming that the initial gasket compression did not deform it permanently — i.e. that the gasket stress did not exceed the yield strength of the material and that it possesses sufficient resilience — the thickness of the gasket will increase by the same amount that the bolts were increased in length. The gasket compressive stress is reduced, but must remain sufficiently high to prevent leakage from taking place between the flanges.

Thus, unless the replacement gasket material is of the same quality as the original gasket and has the same physical properties, the danger exists that it will either be deformed permanently during the tightening of the casing bolts or that it will fail to "bounce back" after internal pressure is applied. In either case, leakage can take place at the casing joint.

As to the thickness of the gasket, it should be realized that too thick a gasket will generally lead to casing cutting through leakage; if the gasket is thinner than the original one, tightening the two casing halves may exert undue force on the casing wearing rings which may become distorted. This, in turn, may lead to contact with the rotating parts and severe damage.

When installing a new gasket, trim the inner edge squarely with sufficient overlap, so that when the upper half of the casing is tightened, it will press the gasket edges against the stationary internal parts to provide sealing against leakage. No overlap should be left at the stuffing box bores.

The trimming of the gasket is best accomplished by first cementing the gasket to the lower half of the casing, using shellac. If powdered graphite is rubbed into the gasket surface before reassembling the pump, the gasket will not stick to the top half of the casing next time that the pump is dismantled. It is then possible to reuse the gasket if it has not been damaged.

QUESTION . . . . . .

IN DISMANTLING one of our high pressure boiler feed pumps last year, we found that the shaft ran 14 mills out of true. We straightened the shaft by peening it with a blunt nose chisel. Just about a year later, the pump developed considerable vibration and it became difficult to pack the stuffing boxes satisfactorily. The pump was again dismantled and we found the shaft cracked. Could the method used to straighten the shaft during the preceding overhaul have caused the shaft failure?

ANSWER . . . . . .

MY FIRST reaction is to ask why was the shaft found to be bent in the first place. If the causes that led to this bending were not discovered and remedied, the same causes could have accelerated the shaft failure. But certainly, additional sources of stress concentration were introduced by the method used in straightening the shaft.

In general, the process of straightening a bent shaft is a risky one. I do not say that this should never be done, but if additional life is obtained from a straightened shaft, this is a "plus" which must be weighed against the possibility that the pump may

have to be overhauled again after a much shorter time interval than if a new shaft had been used. Of course, one also runs the even greater risk of a major failure, should the shaft break during operation instead of failing progressively as in the case you describe.

Any method of shaft straightening which leaves local stresses approaching the yield point of the material will almost certainly result in further warping as soon as the shaft goes through any sort of temperature cycle. This is why straightening by peening as you describe cannot be satisfactory, since the procedure merely puts small areas under compression to deform the shaft.

If a shaft is straightened, stress relieving it after any permanent deformation has taken place is essential. A suggested procedure would be:

1. Bend the shaft to get a permanent set of the same amount, but in the opposite direction.

2. Bend it back, until it is straight.

3. Stress relieve it at 1050 to 1100 F, holding this temperature for four hours.

4. If the shaft is not sufficiently straight, repeat the procedure.

When bending the shaft, it should be supported somewhat inside of the bearing journals at each end. To avoid imposing local compressive stresses equal to or greater than the yield strength, the shaft should be supported in well fitting half-round saddles and the load should be applied through a similar saddle.

The stress relieving must be carried out in a muffle type, controlled atmosphere furnace to minimize surface oxidation. The shaft should be placed in a vertical position, unless it is very uniformly supported throughout its length.

As a possible means of removing a deformation of a few thousandths of an inch, it is suggested that stress relieving alone be tried. The shaft should be placed in a horizontal position, supported near the ends only and with the runout straight up. The results of such a procedure are very uncertain, but might work in some cases.

But, I repeat, replacing the shaft or straightening it is not enough. The cause of the runout should be thoroughly investigated, lest the damage recur.

Mississippi Plant Uses Special Caster Trucks

THE W. G. AVERY Body Company, Jackson, Mississippi, designed and built floor trucks to handle stake truck sectional panels.

Avery manufactures several styles of stake body panels on a large scale for the larger truck manufacturers. During each major production stage of assembly, floor trucks accelerate production and keep handling costs at a minimum.

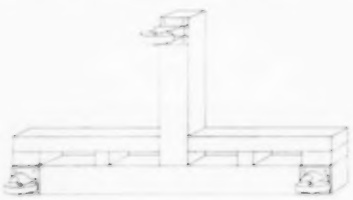
Component panel parts, such as wood slats, formed steel stakes, and hardware are delivered to the points where the panels are assembled. Both side and end panels are assembled in this manner. Across from the assembly benches, paint-dip tanks are conveniently located so that simple hand-to-hand transfer of panels from assembly bench to paint tank is all that is required at this point.

Following quick air drying the finished panels are placed on grooved-based floor trucks which easily handle approximately 20 panels. Filled to capacity, the trucks are easily maneuvered on Faultless Casters with 5" dia., Drawn Steel Wheels.

A second type of castered truck, designed to handle heavy military truck panels, features the use of two swivel and one rigid caster, attached to a "T" shaped wooden truck. See illustrations.

Avery production executives also selected Faultless Casters for these unique trucks.

A single panel is placed onto the truck immediately following assembly. It remains on the truck through storage and paint spraying stages. This style truck permits these heavy panels to be easily moved by one man between departments. The 2½ ft. trucks occupy a minimum of floor space.



N. C. Research Triangle in High Gear

THE RESEARCH Triangle of North Carolina has hit the high road toward achieving the objective of a research center in the South to match other great research complexes of the world. The 4,500-acre Research Triangle Park will be the home of the new Chemstrand Research Center which is now under construction. Recently the establishment of an international center in polymer chemistry in the Research Triangle Park was announced by the Dreyfus Foundation. The Robert M. Hanes Memorial Building of the Research Triangle Institute will also be located in the Triangle at an early date. The two more recent developments are described in detail here.

By JOHN F. LEE
SPI Consultant on Atomics
Broughton Professor and
Mechanical Engineering Dept.
North Carolina State College

Chemstrand Center

Construction began last October on Chemstrand's multi - million dollar research center to be built in the Research Triangle Park southeast of the City of Raleigh.

The facility will be owned and operated by the Chemstrand Research Center, Inc., a newly-formed wholly-owned subsidiary of The Chemstrand Corporation. Designed to house over 450 men and women by 1963, the building is scheduled for occupancy by fall of this year. Dr. David W. Chaney is executive director of research.

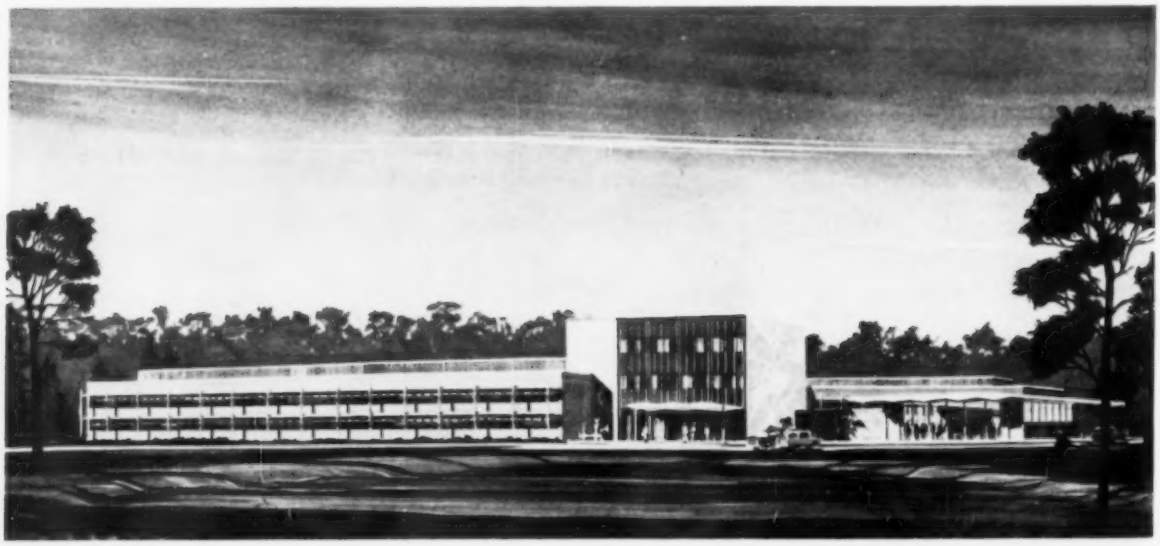
The laboratory building is a sweeping two-story structure of brick and glass accented by a three-story center section to house a reception area, administrative offices and a 10,000-volume technical library. A cafeteria wing connected by a covered passageway adds balance to the structure.

The new building was designed by Wigton-Abbott Corporation of Plainfield, N. J. Contractor on the project will be Daniel Construction Co., according to E. A. O'Neal, Jr, president of the Chemstrand Corp. The total cost will be approximately $5,000,000.

Taking note of the significant event in Chemstrand's 10-year history, O'Neal said: "We take pride in our role as the first research organization to enter the Research Triangle Park, and are looking forward to becoming a citizen of North Carolina."

The Chemstrand Corp., one of the world's largest producers of chemical textile fibers, manufactures Acrilan acrylic fiber at Decatur, Alabama, and Chemstrand nylon at Pensacola, Florida. It only recently announced plans for a second nylon plant to be built near Greenwood, South Carolina.

The Camille and Henry Dreyfus Foundation has made a grant of $2,500,000 for the establishment of



This is an artist's conception of how the Chemstrand Research Center will look. It will house over 450 men and women by 1963. Laboratories will occupy the glass and brick wing to the left while the reception area, administrative offices and a technical library will be housed in the center section. A cafeteria wing is shown at the right.

an international center of polymer chemistry at North Carolina's new Research Triangle Institute. This new research center will be known as the Camille Dreyfus Laboratory, in memory of Dr. Camille Dreyfus who was the founder and first president of Celanese Corporation of America.

Polymer chemistry was an integral part of many of Dr. Dreyfus' now world-famous scientific achievements in the field of cellulosic chemistry, an area of science which gave birth to both the man-made fibers and plastics industries.

Although owned by the Research Triangle Institute, and operated as an integral part of the Institute's research activities, the Camille Dreyfus Laboratory will have its own building, research program, staff and facilities. It will be located on the Research Triangle Institute's 200-acre campus in the 4,500-acre Research Park. The Park, now being developed as a center for research laboratories, is within a 15-mile radius of the University of North Carolina, Duke University and North Carolina State College.

Construction work on the proposed $700,000 laboratory is expected to start in 1960. The building, of contemporary architectural design, will have 20,000 square feet of floor space and will include a 200-seat auditorium for use by regional and national scientific groups.

In making the announcement Governor Hodges said: "We are very proud that the Research Triangle Institute has been selected as the organization to establish and operate a memorial laboratory in honor of Dr. Camille Dreyfus. During his lifetime, Dr. Dreyfus' research in polymer chemistry led to many discoveries that played a major part in the creation of the man-made fiber industry which is so important to our region today. In addition, the company which he founded — Celanese Corporation of America — has been a valued corporate citizen of our state for many years. I understand that the program of the Camille Dreyfus Laboratory will provide for the employment from throughout the world of both internationally recognized scientists and promising young research men. This reflects the international scope of Dr. Dreyfus' activities. It also illustrates that North Carolina, through such efforts as the Research Triangle Institute, is extending its interests and its horizons far beyond the borders of the state or of the nation."

George R. Herbert, President of the Research Triangle Institute, said that an internationally recognized polymer scientist will be selected to organize and direct the scientific program of the Camille Dreyfus Laboratory. Salaries of the fundamental research staff, as well as the necessary scientific equipment and supplies, are provided for in the grant made by the Dreyfus Foundation.

The staff will conduct basic investigations in the chemistry and physics of polymers, including cellulose, and their derivatives, with the objective of expanding the general fund of knowledge in this field. Results of such basic research will be published as papers of the Camille Dreyfus Laboratory of the Research Triangle Institute.

In addition to its fundamental research work, the Dreyfus Laboratory will be of sufficient size to accommodate some applied research activities. It is anticipated that the additional staff required for such work would be supported by applied research contracts from government and industrial sources.

The Camille and Henry Dreyfus Foundation is a non-profit organization established to advance the science of chemistry, chemical engineering and related sciences in order to improve human relations and conditions throughout the world. It is an enduring memorial to Dr. Camille and Dr. Henry Dreyfus, Swiss-born scientists whose own pioneer research contributed significantly to the three major industries, man-made fibers, plastics and chemicals.

The scientific effort of the Camille Dreyfus Laboratory should contribute to the expanding fund of basic knowledge upon which products and industries of the future will be based.

Grinding Wheel Safety

Ten "Do's" and ten "Don'ts" of Grinding Wheel Safety are listed brightly on a red, white and black 12" x 12" wall chart.

Terse copy, easy to read, easy to remember, the chart is designed for hanging in tool rooms, tool cribs, bulletin boards, and on or near grinding machines.

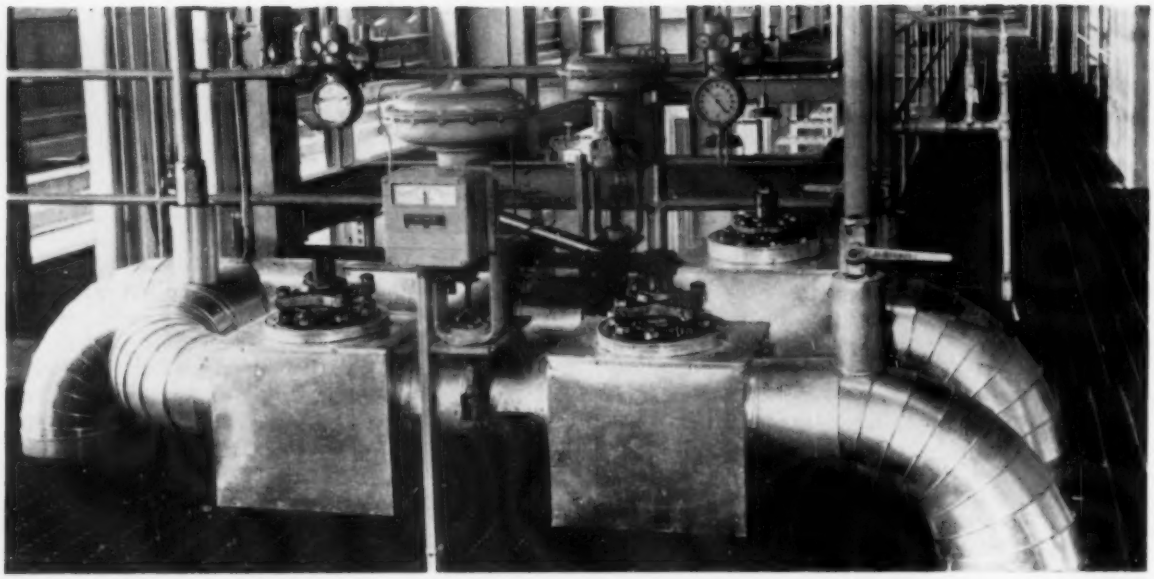
Available from: Advertising Distribution Section, Building W-5, The Carborundum Company, Walmore Road, Niagara Falls, New York.

DO

1. DO always HANDLE AND STORE wheels in a CAREFUL manner.
2. DO VISUALLY INSPECT all wheels before mounting for possible damage in transit.
3. DO CHECK MAXIMUM OPERATING SPEED established for wheel against machine speed.
4. DO CHECK MOUNTING FLANGES for equal and correct diameter. (Should be at least 1/3 diameter of the wheel and relieved around hole.)
5. DO USE MOUNTING BLOTTERS supplied with wheels.
6. DO be sure WORK REST is properly adjusted. (Center of wheel or above; no more than ⅛" away from wheel.)
7. DO always USE A GUARD covering at least one-half of the grinding wheel.
8. Do allow NEWLY MOUNTED WHEELS to run at operating speed, with guard in place, for at least one minute before grinding.
9. DO always WEAR SAFETY GLASSES or some type of eye protection when grinding.
10. DO TURN OFF COOLANT before stopping wheel to avoid creating an out-of-balance condition.

DON'T

1. DON'T use a wheel that HAS BEEN DROPPED.
2. DON'T FORCE a wheel onto the machine OR ALTER the size of the mounting hole—if wheel won't fit the machine, get one that will.
3. DON'T ever EXCEED MAXIMUM OPERATING SPEED established for the wheel.
4. DON'T use mounting flanges on which the bearing surfaces ARE NOT CLEAN AND FLAT.
5. DON'T TIGHTEN the mounting nut EXCESSIVELY.
6. DON'T grind on the SIDE OF THE WHEEL unless wheel is specifically designed for that purpose.
7. DON'T start the machine until the WHEEL GUARD IS IN PLACE.
8. DON'T JAM work into the wheel.
9. DON'T STAND DIRECTLY IN FRONT of a grinding wheel whenever a grinder is started.
10. DON'T grind material for which the WHEEL IS NOT DESIGNED.



The natural gas regulating station for unit No. 4 boiler near the burners.

Insulation for Low Temperature Gas Lines . . . Florida Power Corporation

Foamed Polyurethane Insulation

THE MAIN REASON for insulating low temperature piping is to prevent the formation of condensation. This is particularly important in plants where the temperature of the atmosphere is often higher than the dew point, and inadequate insulation on low temperature lines can result in almost continuous dripping.

That's why Florida Power Corporation gave careful consideration to low temperature insulation when it recently converted its St. Petersburg power plant to natural gas firing. Here the temperature of the natural gas flowing through the supply lines is almost always lower than the dew point of the surrounding air.

Florida Power's basic objective in insulating the gas lines and associated fittings was to prevent "sweating" from 32 F to ambient. In addition, since all of the power company's other insulated surfaces are covered with aluminum, a rigid and dimensionally stable insulation was preferable.

These requirements were met at high thermal efficiency and low cost by Gem-Foam and Gemfil, two forms of a new polyurethane foam material manufactured by Baldwin-Ehret-Hill, Inc.

The cost of the polyurethane material is competitive with other insulations of comparable efficiency. However, because of the material's low K-factor — only .08 Btu per sq ft per hr per deg F at a mean temperature of minus 100 F — substantially reduced thicknesses give the required thermal efficiency. This permits savings in application time and in the quantity of finishing materials required.

Pre-molded rigid polyurethane pipe insulating material was applied to all the natural gas lines. Installation did not require special tools. For straight sections of pipe, molded half-sections, 3 ft long were specified. On elbows and other fittings, the molded half-sections were cut to fit. A 1-in. thickness of the rigid insulating material was used throughout.

Joints were pointed with Foster insulation sealer and the insulation was covered with aluminum jacketing. With a light, easy to handle, 3 lb per cu ft density, Gem-Foam is surprisingly strong, having a compressive strength of 50 psi at 75 F.

Jacket Serves as Mold

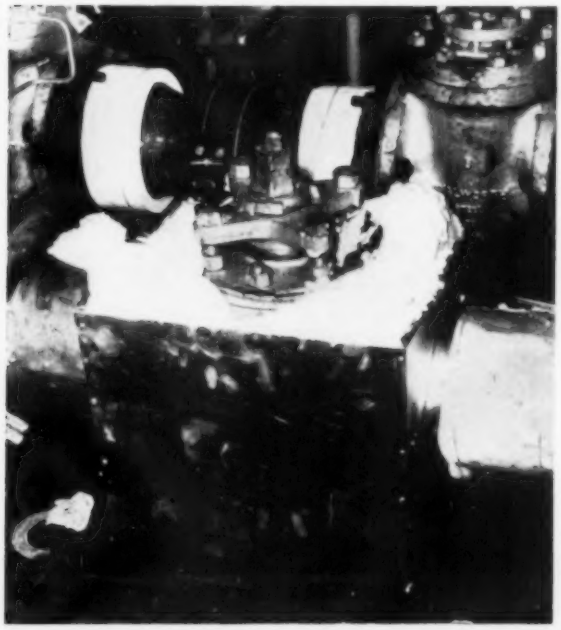
Gemfil, which is poured in place, was cast around valves. The casting method is illustrated in the photos. First, an aluminum box was built around the fitting. Liquid Gemfil was then poured through the top of the box and allowed to foam. After curing, the top of the insulation was trimmed and an aluminum cover was installed. In this way, the aluminum box serves both as a mold for the cast insulation and also as a finish covering.

Contractor for the installation of these two new forms of polyurethane low temperature insulation material was The Aber Company, Baton Rouge, Louisiana.

An aluminum box (above) serves as a mold for casting insulation around valve.

After the aluminum box is secured around the valve (right), liquid insulation is poured.

Liquid insulation completely fills the mold and foams up over its sides (left). It is then trimmed and an aluminum cover installed over the top to complete the metal finish. Covered on all sides by aluminum, the insulated valve presents a neat appearance. Gas lines leading to the valve are insulated with pre-molded rigid polyurethane material which was cut to fit and then pointed with insulation sealer — ready for aluminum jacket.



MANAGEMENT CLINIC

Conducted by ROBERT H. EMERICK, North Charleston, S. C.

Too Much Overtime Gets Men Down

Question . . . . . .

WE ARE a construction company and have won a contract that imposes a stiff penalty if we fail to complete the work by a stipulated date. Since our normal force is not large enough to do the job within the time limit, we propose to hire a number of extra craftsmen to handle the situation.

However, our regular employees have figured out that by working an average of 12 hours daily, they can eliminate the need for new "hires" and pick up a sizeable bonus in overtime dollars. They want to do this, but our safety director feels that so much overtime will bring on an increase in accidents, and he is dead set against it.

Are any data available on the amount of overwork a man can take before he becomes more accident prone?

Suggestion . . . . . .

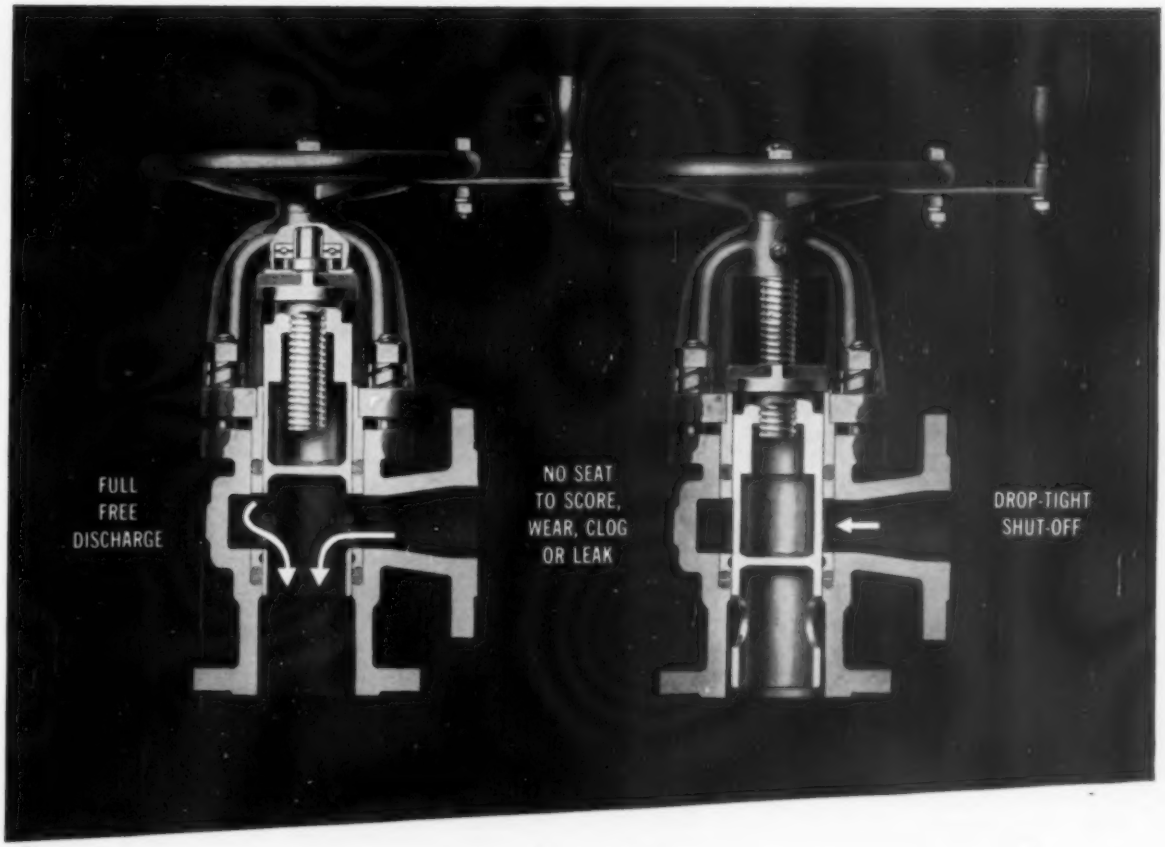
A GREAT DEAL of data were collected by industry during the war years, when practically everybody was working overtime. But the measure of weariness that produces an accident is as variable as human endurance is variable. We have not been able to identify any number of overtime hours which can be taken as the dividing line between normal accident frequency, and the development of an extra hazardous state.

What you can expect after two or three weeks of unbroken 12 hour days, is not so much an increase in accidents, but a decrease in work output. Men become bored, move more slowly, sometimes fall asleep unintentionally in the wash-rooms. After such a protracted run, even a day off is not effective in reviving performance.

Possibly one of the most intense of industrial efforts was made at the Pearl Harbor Navy Yard, beginning on December 8, 1941. Every employee went on the 12 hour day, and continued on this schedule for approximately two months. By that time work output sloughed off so badly, that every eighth day was designated an employee's day off. But it did not help very much. Eventually the standard work day became 10 hours, with every eighth day off, and on this schedule production peaked.

We have investigated the overtime picture elsewhere, and our findings parallel the Pearl Harbor experience, namely that 10 hour days can be taken in stride, but longer ones do not pay. We suggest that you measure up the 10 hour man-day against your job completion date, and calculate your total man-power accordingly.

From the safety standpoint, we believe that the judgment of an employee's safe working ability should be the responsibility of his supervisor. An observed condition of extreme weariness should be reason enough for taking a man off the job, regardless of his objections.



open and shut case!

...FOR TROUBLE-FREE PERFORMANCE WITH YARWAY SEATLESS BLOW-OFF VALVES

Mention Yarway Seatless Blow-Off Valves in more than 16,000 boiler plants, and you'll get solid approval—for these plants have first-hand *experience* with the dependable, trouble-free, service of Yarways.

For boiler blow-down service at all pressures up to 415 psi, YARWAY SEATLESS (in tandem) is the popular choice.

Outstanding feature is the famous seatless design—*there is no seat to score, wear, clog or leak*. Nitralloy hollow sliding plunger permits full, free discharge, yet keeps valve drop-tight in closed position. *No other blow-off valve has these features.*

Specify Yarway Seatless Valves when ordering new boilers and when replacing worn or inefficient blow-off valves on your present boilers.

Yarway Bulletin B-427 gives full information. Write for it today.

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YARWAY
A MARK OF QUALITY IN STEAM ENGINEERING

Wall Openings Sealed

McMeekin Station
South Carolina

SOUTH CAROLINA Electric and Gas Company has made novel use of neoprene coated nylon fabric for weatherproofing wall openings through which steam and water pipes enter its new McMeekin Generating Station.

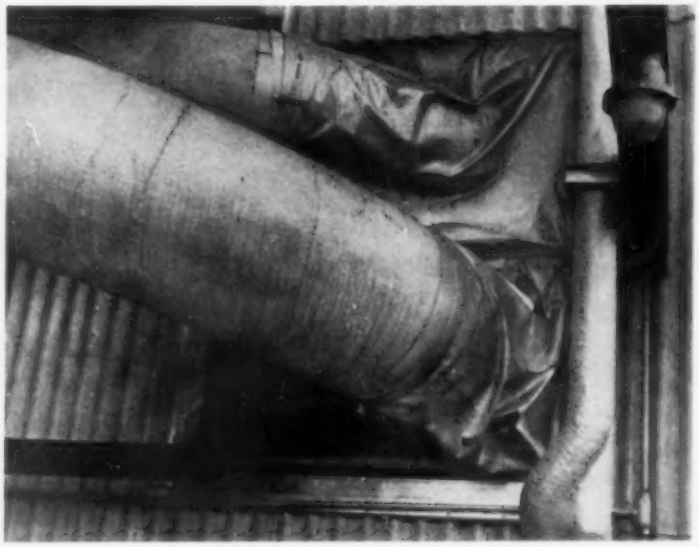
A rigid arrangement is impossible for this purpose, because the pipes expand and contract with varying temperatures, and they may move as much as three inches in any one direction. Temperature at points where the material is in contact with insulated pipes reaches 150 F.

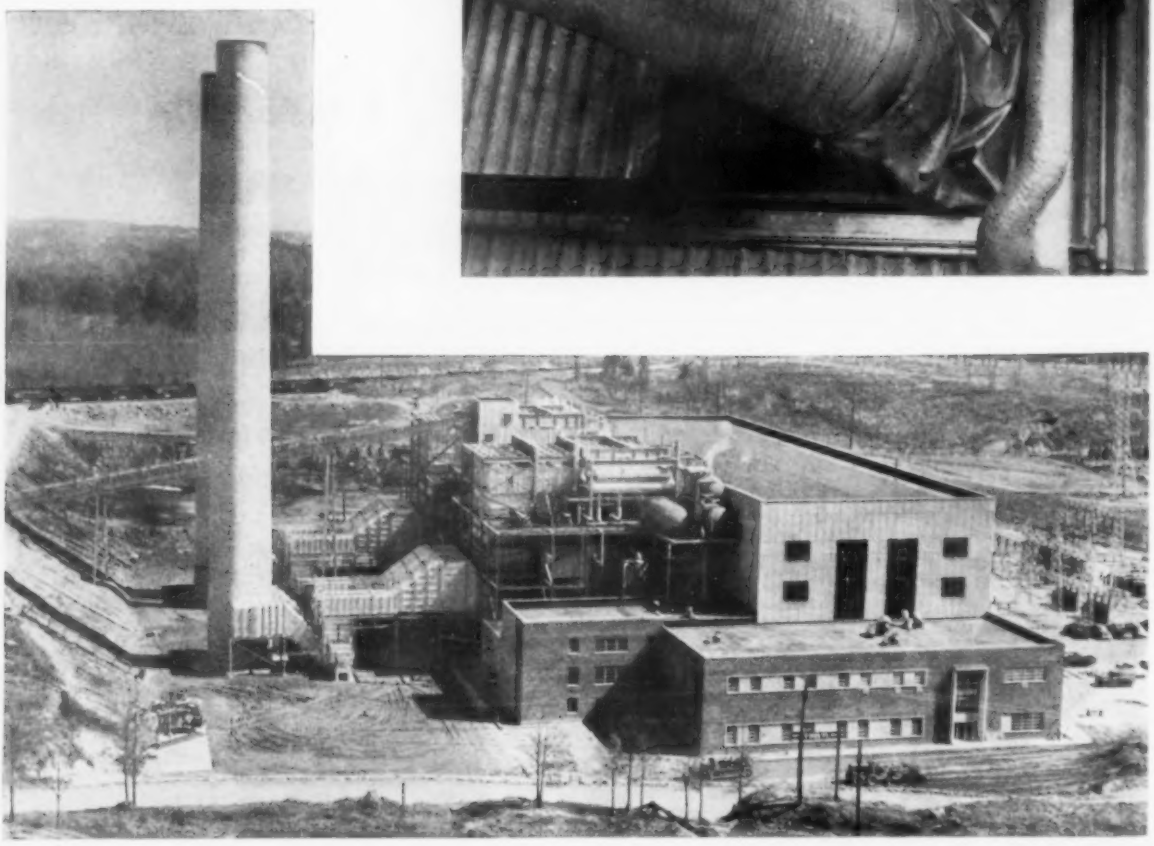
A flexible material is, therefore, the solution. However, some of the materials used elsewhere did not last long. They did not stand up to the temperature and humidity present and they rotted and tore under the stresses exerted by the moving pipe.

To provide a more lasting weatherproofing, the Columbia Tent & Awning Company, a local canvas fabricator, suggested neoprene coated Coverlight-N, a synthetic rubber coated nylon fabric made by the Vulcan Rubber Products Division, Reeves Brothers, Inc.

After field testing the material for durability, the construction consultant for the new station commissioned the canvas fabricator to make 12 fitted wall-opening covers, in sizes 6 by 9 ft and 7 by 9 ft. Total cost including labor for the installation was about $650.

The material is held around the pipes with clamping bands and is secured to the walls with clamping flanges and strips.





Kaiser Saved $16,000 on Motors

ENGINEERS at Kaiser Aluminum and Chemical Corporation, Chalmette, La., wanted to change the plant's fume control set-up. They decided that one big central system would be better than the existing four individual water-based scrubbing units. This meant increasing total water through-put from 3600 gpm to 4200 gpm, and, of course, increasing pump capacity.

Thus, the pump motors would have to deliver more power. But these four 200 hp TEFC motors were already running at their maximum. They could have installed new motors, but it wouldn't have been simple. New 250 hp motors would have meant larger frames, requiring larger concrete pedestals, new fittings, starters, and controls, plus installation time and expense.

Instead, Kaiser engineers turned to silicone insulation. By getting their existing 200-hp motors rewound with silicone components, they uprated them to 250 hp. This is possible because silicone insulation can withstand far greater heat, allowing the motor to operate at greater capacity without burning out. A silicone rewind can increase a motor's power by as much as 50%. The rewound motors at Kaiser performed like new, and the savings achieved amounted to $16,000.

In addition, there was no lengthy shutdown or drop in pumping output. Industrial Electric Company of New Orleans furnished Kaiser with a spare motor while they rewound the others one by one. The rewound motors have been operating steadily ever since, and Kaiser is getting the benefit of increased through-put at the least possible expense.

Motor Souped-Up

WISCASSETT Mills of Albemarle, N. C., had a problem with one of four centrifugal pump drive units in its package dyeing operation. Like the other three drive motors, this motor was exposed to relative humidity ranging from 90% to 100% and ambient temperatures as high as 130 F.

Unlike the others, however, this motor was only 60 hp. The rest were 75 hp. The combination of overloading and high ambient temperatures raised the winding temperatures above the design limits of the Class A insulated 60 hp motor. It was out of service frequently because of insulation failure.

Although Wiscassett kept a spare motor ready for immediate substitution, there was a lot of time, money and production loss. Every time the motor failed, removal and replacement with the standby cost $90. Eight to twelve hours of work were needed, up to 2000 pounds of yarn were lost, and the whole operation was generally slowed down . . . all of which totalled up to a tidy sum to add to the cost of rewinding the motor.

Clearly, something had to be done. The lack of thermal stability and moisture resistance was the weakness of the organic insulation system, so silicone insulation was chosen to solve the problem.

When Wiscassett had the 60-hp motor rewound with silicone insulation, its load carrying capability upped well over 25%! Ever since, it's been carrying its load without difficulty.

Checking out the Super COILIFE protected stator after being submerged for 99 days in Great Salt Lake.

Super COILIFE Triumphs Over Motor-Killing Brine Throughout 99-Day Endurance Test in Great Salt Lake

A Westinghouse stator recently spent 99 days of continuous torture at the bottom of Great Salt Lake. The salinity of the water averages 27% by analysis. Other than to rapidly gather salt until it was completely buried, the Super COILIFE* winding shrugged off the entire indignity. This Super COILIFE encapsulated unit meggered "infinity" . . . performance was identical to the pretest reading of the rewound motor.

This unprecedented torture test in the lake was not the only punishment inflicted upon this same motor. The river boat Sprague, over a period of 432 hours, had towed it underwater 1500 miles from Vicksburg, Mississippi, to Pittsburgh, Pennsylvania. In neither case was the Super COILIFE insulation affected by these rugged tests.

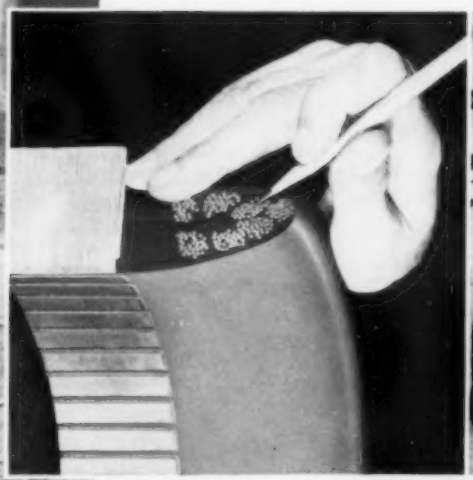
Acids, alkalis, oil, dirt and other contaminants are just as effectively . . . and permanently . . . stopped by Super COILIFE. A solventless epoxy is responsible for this extraordinary property of the insulation. Super COILIFE is thermally stable, chemically inert and stays elastic in response to thermal cycles of the windings. The exclusive process of applying Super COILIFE accurately controls the predetermined thin wall of the encapsulation for maximum dissipation of heat from windings. The surface will not crack or craze under severe operating conditions.

Super COILIFE is available only from Westinghouse Repair plants. Specify it for the rewinding and modernization of your motors to extend motor life and to protect your original investment.

For more information call your Westinghouse Representative, or write for Booklet B-7622 to Westinghouse Electric Corporation, P. O. Box 868, 3 Gateway Center, Pittsburgh 30, Pa.

J-95210-R

*Trade-Mark

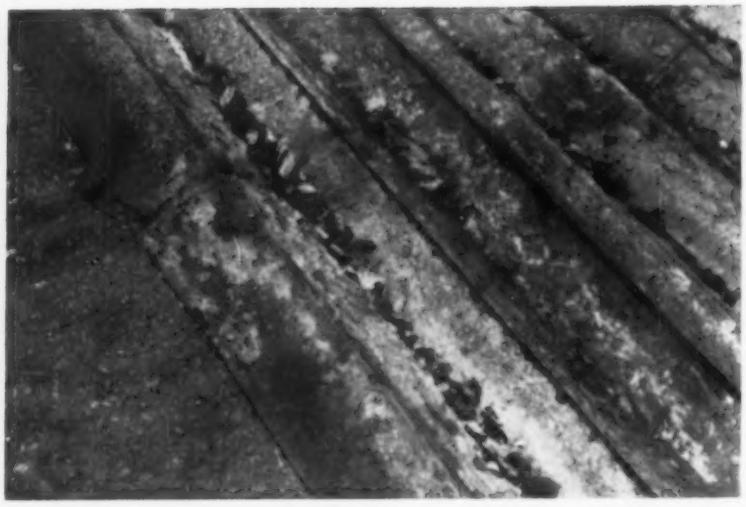


Exclusive encapsulation process carefully controls the thin wall of Super COILIFE insulation . . . permits maximum heat dissipation, eliminates failures from contamination.

Stator being dragged from 99-day-long briny bath . . . since stator was inoperative during this entire period, Super COILIFE again has proved its ability to protect the windings from salt water and other contaminants.

YOU CAN BE SURE... IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV ALTERNATE FRIDAYS



Corrosion of Eliminators in Industrial Air Washer

PROBLEMS in the treatment and proper control of water in air conditioning systems are varied and almost proportional to the type of water being used in the system and the type of operation of the plant. Maintenance or lack of maintenance also has its vital part. Some industries, as part of their manufacturing, have difficulty with lint of not only cotton fibers but also man made fibers which must be "wet out" in an air washer to prevent matting on top of the water. If these fibers are dropped to the bottom, maximum operating efficiency of the air washer itself is achieved. Some industries have problems of oil while still others have corrosion problems along with some of the above.

The attached picture illustrates a rather unusual condition from the standpoint of corrosion of eliminators in a large air washer in a Tennessee manufacturing plant. The eliminators were made of aluminum and casual observance from both inside the air washer and outside the air washer showed the eliminators apparently to be in very good condition. Periodic washing out of the unit showed nothing unusual other than that the system was clean and apparently under good control.

However, on a regular maintenance cleaning service during a summer vacation shut down, the eliminators were removed so that they as well as the washer could be cleaned and the washer repainted. During one of these maintenance programs, these eliminators were removed and the condition was found as illustrated.

On the inside of the eliminators where small volumes of water would reach and then be evaporated, extensive corrosion of the aluminum was taking place. The metal was so thin that the slightest pressure would shatter the eliminator. The condition was such that re-installing them would have been entirely unsatisfactory. Replacement was necessary, but what material should be used?

After examination of the water supply through chemical analysis and examination of the deposit as a result of the corrosion on the aluminum, it was recommended that the aluminum eliminators be replaced with galvanized metal or plastic eliminators.

A complete change was also recommended on their existing water treatment program so as to alter the quality of the water to such a degree that corrosion from the natural mineral constituents would be eliminated and, thereby, protection afforded the new eliminators in that particular washer as well as other eliminators in existing air washers throughout the plant.

A closely controlled water treatment program is now being maintained. The new galvanized eliminators have now been in service for over a year and a half and are clean and well protected.

By CLYDE A. FARRIS, JR.
Water Services, Inc.
Knoxville, Tennessee

Cheap Protection

SINCE OUR plant is bisected by a number of roads, we keep out of trouble with road authorities when moving heavy machinery across by bridging the highway with old tires across which the machinery travels.

The tires do a good job of protection and are the cheapest and quickest method we've found for this chore.

By STAN CLARK, Maintenance Supervisor, U. S. Phosphate Co., Tampa.

Filtered Air for Compressors

By DONALD M. FIENE
American Air Filter Company, Inc.

THE BOILER HOUSE at General Electric Company's Appliance Park, near Louisville, Kentucky, supplies heating and process steam, and also compressed air, to this entire industrial community — some buildings of which are as far as one mile away from the boiler house.

Steam is supplied by five coal-fired boilers, each with a rated capacity of 150,000 lb per hour at 245 psi. Compressed air at 100 psi is supplied to the factories by five compressors — three Cooper-Bessemer, two Ingersoll-Rand. Each compressor is rated at 5000 cfm and is driven by a 1000-hp synchronous motor. Current air demand during working hours is approximately 19,000 cfm. This compressed air is cooled to about 100 F by aftercoolers and then cooled to approximately 50 F (by a Worthington refrigerant system) to remove moisture. The air is further dehumidified as it passes through a separator, a bauxite-ore prefilter and a silica-gel dryer. Air is delivered to the factories at a dewpoint of approximately —10 F.

Two Cycoils installed in tandem on roof adjacent to compressor room — General Electric Appliance Park, Louisville, Kentucky.

It is standard practice in industry to filter intake air to compressors. High speed compressors such as those installed in G-E's plant would soon show serious wear and dirt build-up if they were not protected by air filters. There would be danger of breakage and fire; the maintenance schedule for inspection and cleaning would be frequent and costly.

At the present time, G-E is using two types of filters on its air compressors (in the above installation). Three compressors are protected by unit-type compressor filters which use cloth as the filtering media. The cloth is periodically removed, cleaned of collected dirt particles and then returned to the filter unit. Two compressors are fitted with oil-bath filters. Dirt collects as sludge in the bottom of these filters; it is periodically removed and replaced with clean oil. The current maintenance schedule on filters and compressors is inspection and cleaning once every six months.

The filters have prevented damage to the compressors, and repairs owing to wear and dirt build-up have not been necessary. In six months, however, there is some accumulation of dirt even with filters. Valves, especially, must be carefully inspected and cleaned. In this particular installation there is good evidence that the oil-bath filters offer the best protection to the compressor valves. Operating personnel reported that valve-cleaning demands are considerably lower on compressors using oil-bath filters — the difference being in the vicinity of 20% less dirt.

The oil-bath filters, manufactured by the American Air Filter Company, are of the design known as type W cycoils. The units are cylindrical in shape, and on this application about 7 feet high and 3½ feet in diameter. To handle five thousand cfm two cycoil filters are mounted together in tandem and installed on the inlet of each compressor.

Valve Maintenance Clinics

In 1954 the Hancock Products Division of Manning, Maxwell & Moore, Inc., decided that through the establishment of Valve Maintenance Clinics at the plant sites they could render a valuable service to the user. Since then they have presented clinics throughout the South and Southwest.

The purpose of the clinic is to show "on the spot" successful methods of maintaining Hancock valves. This is done through the medium of having actual production valves available. A design "run-through" is given, to better familiarize the maintenance, operating and engineering personnel with the thinking behind the design.

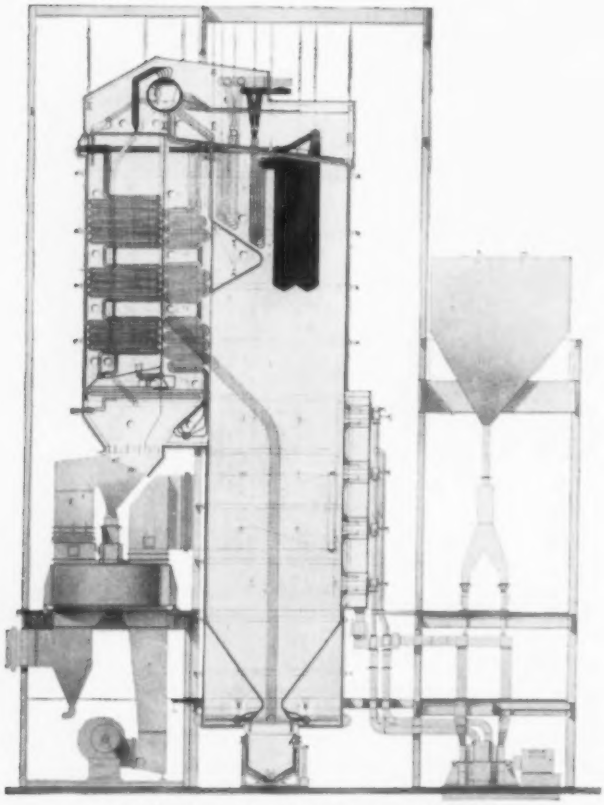
After the run-through a Hancock maintenance engineer takes the group through the actual steps of maintenance of each design, covering such items as packing under pressure, complete disassembly, refinishing of seats and discs or wedges, complete reassembly, and proper method of usage after installation. Through this maintenance discourse many helpful tips are passed along to the users, covering valves in general. Proper tools are shown for refinishing of stellite on the seats and discs, for relapping, and many other ideas that the maintenance engineer has determined through years of actual field maintenance work.

Following the presentation of each class of valve there is a discussion period pertaining to that class, and these discussions are most helpful to both the user and the manufacturer.

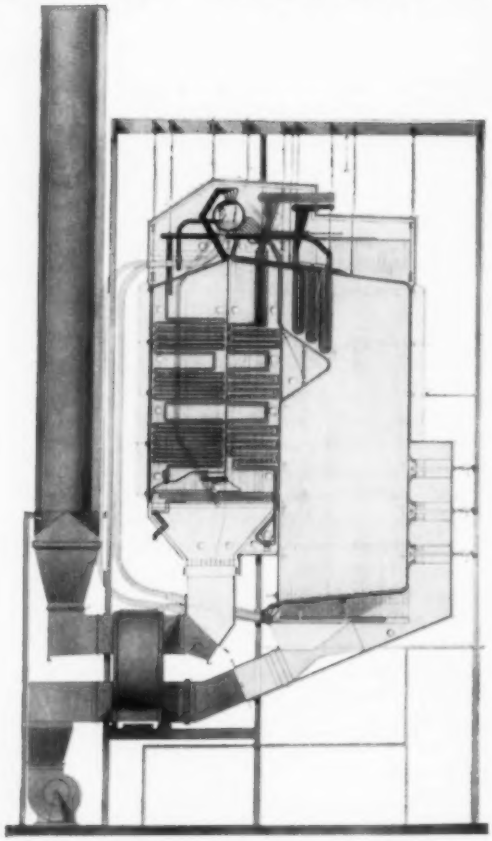
As a result of these clinics and the questions and answers that are a part of them, M M & M has compiled a Hancock Maintenance Manual which has been distributed in rather large volume throughout the public utilities plants.

They expect to continue presentation of Maintenance Clinics and already have compiled a backlog of requests. To participate, all you have to do is to make a request to a Manning, Maxwell & Moore sales representative.

Are You Planning To Burn COAL? OIL or GAS?



950,000 lbs./hr., 1950 psig, 1000/1000F;
Fired By Riley Pulverizers, Flare Type Burners



1,020,000 lbs./hr., 1925 psig, 1005/1005F;
Fired By Gas, Oil — Pressurized Furnace

Riley Custom Boiler Engineering, Know-How In Combustion Can Give You Top Performance Regardless Of The

Riley Boilers Equipped With Complete Riley Fuel Burning Systems

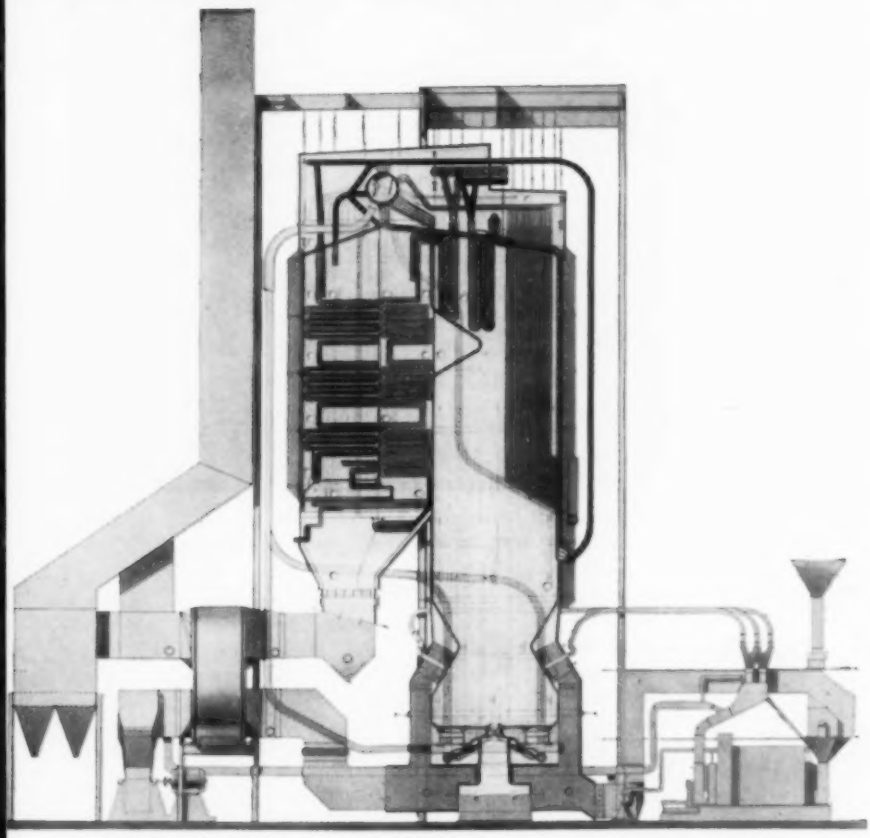
For pulverizing coal Riley offers two types of mills: the Riley Pulverizer and the Riley Ball Mill. These are used with either horizontal Riley Flare Type Gas/Oil/ Coal Burners, or with Riley multiple fuel Directional Flame Burners in Turbo Furnaces. A Riley Boiler installation complete with Riley fuel burning equipment assures Riley's undivided responsibility.

Turbo Furnace Boilers Designed Especially For Multiple Fuels

The Riley Turbo Furnace is ideally suited to firing multiple fuels. When firing coal furnace remains slag-free, flyash disposal is eliminated, carbon loss is negligible. Flame characteristics of gas, oil and coal are similar, simplifying steam temperature control. Available with reheat, non-reheat, with pressurized and non-pressurized furnaces in all capacities and pressures.

A Survey Of Your Plant by A Qualified Consulting Engineer Can Show You Ways To Mak

or ALL THREE ?



1,600,000 lbs./hr., 2125 psig, 1005/1005F; Turbo Furnace with Riley Ball Mills; Pressurized Furnace. Fuels — Gas, Oil, Coal

SOME PUBLIC UTILITIES USING RILEY EQUIPMENT

Louisiana Power & Light Co. (3)
Texas Electric Service Co. (3)
Houston Lighting & Power Co. (13)
Dallas Power & Light Co. (3)
Kansas Gas & Electric Co.
Public Service Co. of Indiana, Inc. (12)
New Orleans Public Service, Inc. (3)
The Holyoke Water Power Co.
Columbus & Southern Ohio Elec. Co.
Central Illinois Light Co. (8)
Hartford Electric Light Co.
Central Power & Light Co.
Monongahela Power Company
Arkansas Power & Light Co.
Southwestern Gas & Electric Co.
Utah Power & Light Co. (3)
Florida Power Corporation (2)
Delaware Power & Light Co.
Minnesota Power & Light Co. (2)
Pacific Gas & Electric Co.
Iowa Public Service Co.
Commonwealth Edison Co.
Manila Electric Co.
Southern Nevada Power Co.
Interstate Power Co. (7)
Northern States Power Co.
Central Louisiana Elec. Co. (2)
Union Electric Co. of Ill. (2)
Northern Virginia Power Co.
Union Electric Co. of Mo. (7)
Pennsylvania Electric Co.
Iowa Electric Light & Power Co. (3)
Iowa-Illinois Gas & Electric Co. (7)
Montana-Dakota Utilities Co.
Mississippi Power Company
Philadelphia Electric Co. (4)
Central Ohio Light & Power Co. (6)
Gulf Power Co. (4)
Otter Tail Power Co. (5)
Public Service Elec. & Gas (N.J.) (7)
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Taiwan Power Company (2)

Numbers Indicate Repeat Orders

Techniques, Selectivity Of Fuel Burning Equipment Nature of Fuel, Load, and Steam Conditions

Riley Provides Skilled Construction Engineering Services

Riley Stoker Corporation supplies complete construction services. Riley construction crews employ the latest in construction methods and techniques.

Experienced Service Engineers Assist In Maintaining Safe, Efficient Operation Of Your Boiler

Riley Service Engineers are trained for prompt and efficient servicing of all Riley installations. These experienced engineers work closely with your operators.

Riley Stoker Corporation, having successfully met the challenge imposed by the remarkable growth of the public utilities in the past decade is thoroughly prepared to meet the even greater challenges to come.

Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Jacksonville, Kansas City, Los Angeles, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Salt Lake City, San Francisco, Seattle, St. Louis, St. Paul, Syracuse, Worcester.

RILEY STOKER CORPORATION, WORCESTER, MASS.

RILEY

STEAM GENERATING & FUEL BURNING EQUIPMENT

Surprising Savings In Your Power Costs

About two weeks before shutdown for cleaning and refinishing, here is how the fans look.

About two weeks after cleaning and refinishing, here is how the same fans look.

Moist Contaminated Air Presents Corrosion Problem

Special Paint for Fans

ONE PROMINENT southern textile mill making combed yarn goods, including broadcloths, twills, and sateens, closes the week of July 4 for vacations, and any major maintenance problems are handled at that time.

Two air wash fans with blades of six feet diameter were subjected to moisture which made corrosion of the steel blades a problem. Impurities in the recirculated air further contributed to corrosion.

These fans were in operation several years before cleaning, and the first time they were cleaned the deposits of corrosion were so bad that cleaning threw them out of balance. The housings were also in poor condition.

Now the fans are scraped and painted once each year. Several protective coatings were tried without success. Now a protective coating is used with corrosion resistant characteristics, and the new finish does a good job of protecting the fans and housings, according to a mill official. Less deposits are in evidence, cleaning is easier, and less time is required for cleaning and refinishing.

The washed air system is used for humidification, and while the system and ducts are gone over, the corrosion resistant finish is applied part way into the ducts.

Rustoleum is used on the remainder of the duct work which is galvanized sheet metal. There is approximately 1,000 feet of duct work involved in this instance.

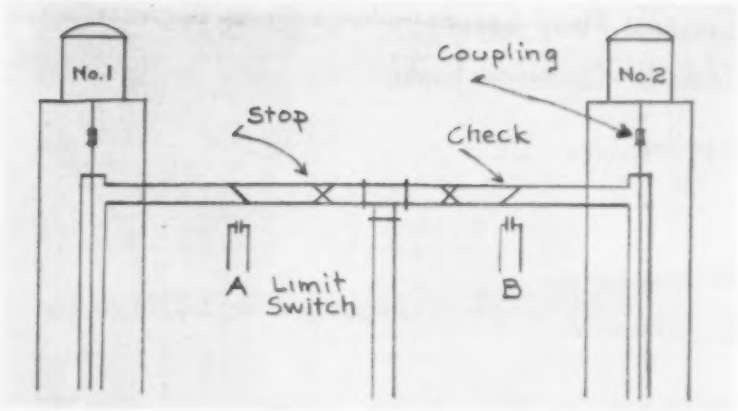
"Damproof" red paint is used on the inlet guards and shaft.

Four men clean and paint fans, and four men clean and paint ducts. The black coating used for corrosion resistant finish on the fans is called Rubalt, RE grade, and was supplied by the Carrier Corp. Before the change, the mill had to paint the surfaces twice a year. The resultant savings amount to about $400 in labor savings and about $50.00 saved on paint used on the fans.

KEEP UP-TO-DATE
USE SPI
READER SERVICE

See Page 77

Reverse Pump Operation Prevented



TWO IDENTICAL 14-inch vertical centrifugal pumps furnish water to a common line for our ash sluice system. The pumps are operated one at a time. Each has a capacity of 1750 gpm at 510 ft head and is driven by a 300 hp motor.

Some time ago the ash pit operator called the control room and asked that a pump be started on the ash disposal system. Pump No. 2 had been used by the previous shift, so the control room operator started pump No. 1. The attendant soon noted that the vacuum was low on the dust system even though the pilot light showed a pump in operation.

He visited the pumping station and found low pump discharge pressure on the common line. He called the control room to have the operator stop pump No. 1 and start pump No. 2 as he figured something was wrong with pump No. 1. The ash system operator was soon informed that pump No. 2 would not start.

This was at night, but a flashlight examination showed something sticking out of the top of No. 2 motor housing. The operators then closed the discharge valve on pump No. 2 to the common line, and pump No. 1 was started.

The following morning our maintenance men found the pump motor shaft sticking through the housing. There was also evidence that the coupling had come partly unscrewed between pump and motor. And it appeared that the pump had operated in reverse rotation until the motor jambed its shaft through the housing.

Upon removal of check valve cover — here was the culprit. The check valve was partly open. It had failed to close when pump No. 2 was stopped by the afternoon shift. Then, when pump No. 1 was started, water rushed through the partly closed check valve with sufficient force to operate pump No. 2 in reverse. Considerable damage was done to both pump and motor.

While repairs were being made to No. 2 pump and motor our maintenance men came up with the following idea. The flapper was removed from the check valve. The original check valve shaft bearing was removed and a new shaft was made that extended through a stuffing box in one side of the check valve body. Then, the flapper was pinned to this new shaft. An arm was welded to the end of the shaft on the outside of the check valve housing and the arm was connected to a limit switch.

When the work was completed on the pump and motor of No. 2 and the unit was operating satisfactorily, similar changes were made on the other pump (see sketch).

Limit switch B on pump No. 2 was connected into the starting circuit of motor on pump No. 1. Limit switch A on pump No. 1 was connected into the starting circuit of motor on pump No. 2. With the above arrangement when both pump check valves are closed either pump may be started. If one check valve fails to close, its opposite pump cannot be started. The arm on the end of the check valve shaft acts also as an indicator of the position of the check valve flapper.

By GEORGE G. AVANT
Wilmington, North Carolina

Corrosion Resistant Valves for Sea Water Lines

TURBULENT flow conditions produced by partially opened metering valves in sea water lines call for highly corrosion-erosion resistant alloys to assure accurate control, long life and positive shut-off when required.

The corrosion resistance of valves for marine service has been markedly improved by the adoption of Ni-Resist cast iron bodies with Monel nickel-copper alloy trim. Monel bodies have also been used with excellent success.

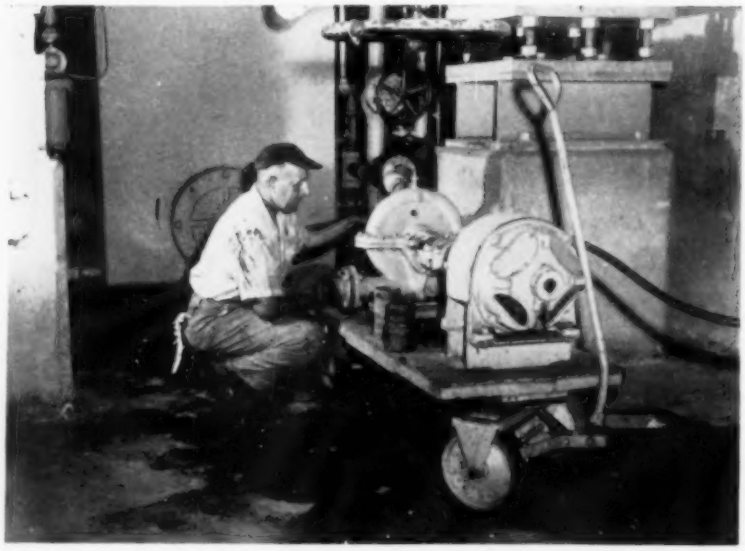
In line with their continuous evaluations of all types of marine valves, the Marine Corrosion Testing Station of The International Nickel Co., Inc. at Harbor Island, N. C., has been testing a number of all stainless steel valves including gate, globe, "Y" and needle type valves in continuous service in sea water lines since 1955.

All components of these valves, except for the TFE resin packings were made from a special corrosion resistant stainless steel containing 29% Ni, 20% Cr, 4% Cu and 3% Mo.

No maintenance has been required during the four years of operation of these valves, despite the continuous high velocity sea water flow. Periodic inspections of the valves have shown them to be in as good as new condition, free from any corrosion damage.

By D. B. ANDERSON, Kure Beach Testing Station, Wrightsville Beach, N. C.

Portable Pump Speeds Tests for Condenser Leaks



THE PROBLEM of finding leaking tubes in the plant's condensers is a simple one. The steam side of the condenser is filled with distilled water or condensate, which is used for steam production in the boilers. The tube is easily found because the condensate, which surrounds the tubes, conspicuously flows through the leak hole and out the end of the leading tube.

What, then, is our problem? We, of course, couldn't fill the steam side with water and drain the cooling water from the condenser with the boiler and turbine in service. The job makes it necessary to take from 25,000 to 50,000 revenue laden kilowatts from our system. The time element involved in filling the condenser was our main problem since the facilities for pumping the condensate were far too slow. We needed another pump to pull water from our condensate storage tanks to our condensers.

A portable pump was rigged to a cart so that it can be pulled to whichever of our three condensers is in need of testing.

Job time has been cut nearly in half, making the unit ready for service hours sooner; and kilowatts, which had been lost before, were on their way to customers.

The photo shows the pump being adjusted during preparations for testing the condenser.

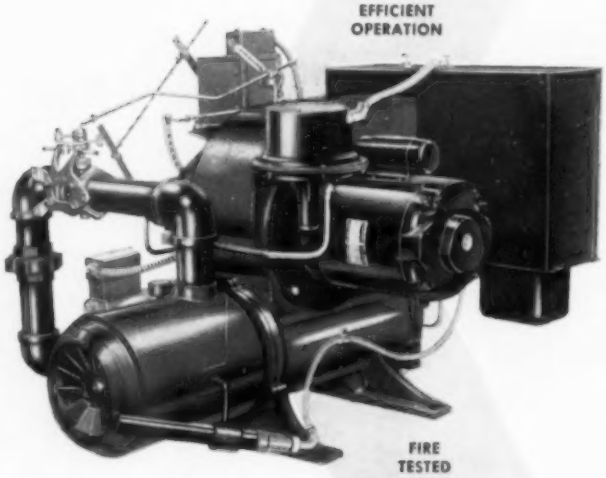
By A. J. DeSTEFANO, JR., Plant Hagood, South Carolina Electric and Gas Co., Charleston, S. C.

Low cost gas burner outstandingly efficient at all flame settings

Precision-engineered commercial-industrial Hev-E-Duty power gas burners are the low-cost answer to high heating efficiency with gas. Automatic electric ignition assures safe starting. Built-in low fire start that builds up slowly to the flame size required means smooth, safe operation. Minimum low fire and maximum high fire can be controlled exactly for top efficiency with any boiler or furnace.

Once set, the burner maintains this setting automatically regardless of weather. Sizes from 720,000 to 21,000,000 BTU. Hev-E-Oil and combination gas/oil models also available. For more information write Industrial Combustion, Inc., 4507 N. Oakland Ave., Milwaukee 11, Wis., Dept. SPI-20.

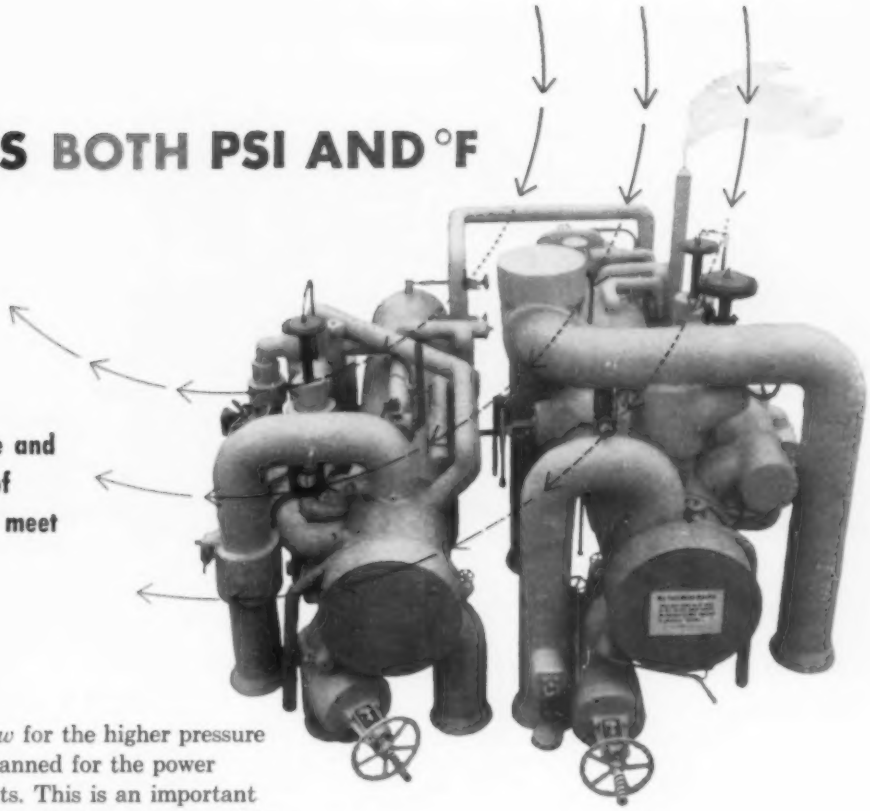
COMPLETE PACKAGE
SIMPLE INSTALLATION
LOW FIRE START
EFFICIENT OPERATION



FIRE TESTED
FULLY APPROVED
FACTORY GUARANTEED

INDUSTRIAL COMBUSTION INC.
EXECUTIVE OFFICE: 4507 N. OAKLAND AVE., MILWAUKEE 11, WISCONSIN

YUBA LICKS BOTH PSI AND °F



Exclusive Multilok Closure and all-welded construction of Yuba Feedwater Heaters meet requirements of newer generating stations

Yuba has the products *now* for the higher pressure and temperature ranges planned for the power industry's new steam plants. This is an important reason why Yuba Feedwater Heaters are so widely specified throughout the industry today. Operating in the 4,000 PSI, 1,000 °F range now, Yuba Feedwater Heaters, incorporating the exclusive *Multilok Closure*, are suited for all future pressure and temperature developments.

Advanced engineering keeps Yuba ahead . . . the new *all-welded construction*, for example. Shells are welded to channels without flanges, eliminating possible leakage that can occur in other construction at high pressures and temperatures. For low and intermediate pressures, Yuba's bolted design is applicable.

When space is important, Yuba can combine several heaters—effectively designing two or more stages in a single shell. For all your needs, Yuba specialists will discuss with you in detail, the design, construction and advantages of Yuba's *years ahead* Feedwater Heaters.

Other Yuba products for steam power plants include Condensers, Evaporators, Expansion Joints, Heaters, Tanks, Cranes, Structural Steel and scores of other items.

specialists in power plant equipment

YUBA HEAT TRANSFER DIVISION

4th and Main Streets, Honesdale, Pennsylvania

YUBA CONSOLIDATED INDUSTRIES, INC.

Sales Offices in Atlanta • Buffalo • Chicago • Cleveland • Houston • Los Angeles • New York • Philadelphia • Pittsburgh • San Francisco • Seattle

Southern News Briefs (Continued from P. 26)

Officers of the newly-formed Continental Conveyor and Equipment Co. Left to right: George Maples, President; Nelson Kemp, Chairman; Raymond Kirkpatrick, Vice-President and Treasurer.

Continental Conveyor Buys Ind. Div., Continental Gin

Continental Conveyor and Equipment Co., a new corporation composed principally of personnel of the parent organization, has completed purchase of the **Industrial Division of Continental Gin Company, Birmingham.** While currently operating from the original base, future plans include construction of new facilities in Winfield, Ala., 80 miles north of Birmingham.

Heading up the corporation are Nelson J. Kemp, Chairman, George R. Maples, Jr., President, and Raymond C. Kirkpatrick, Vice-President and Treasurer. Mr. Maples has been General Manager of the Industrial Division of the Gin Company for some time, while Mr. Kemp was Vice-President and Finance Director, and Mr. Kirkpatrick was Comptroller.

The purchase includes a substantial part of the machine tools and other facilities for production as well as current inventory and other assets. The new management emphasizes that change in ownership and corporate name will not affect company policies or products. The brand name "Continental Conveyor," will be retained and complete conveyor service will continue to be offered, along with replacement and repair service on existing installations.

Westinghouse Canned Motor Pumps for VEPCO

Westinghouse Electric Corporation will provide three canned motor pumps for use in a controlled-circulation boiler that will be installed at the Possum Point Station of Virginia Electric and Power Company near Quantico, Va.

These pumps, each rated at 11,000 gallons per minute, will be used on the No. 4 boiler at the utility's Possum Point Station. The pumps will operate at 1800 rpm and are designed to pump fluids up to 660 degrees F at 3000 psi. They will be manufactured at the atomic equipment department plant of Westinghouse near Cheswick, Pa. These units are similar to canned pumps being provided for nuclear power applications where reliability and high over-all efficiency is required in pumping high pressure radioactive fluids.

Delivery of these units is scheduled for late 1961. Stone and Webster Engineering Corporation served as consultants on this application, and are engineers and constructors of the present station extension. Combustion Engineering Inc., is the builder of the controlled circulation boiler.

American Gilsonite — Ga.

American Gilsonite Company, Salt Lake City, Utah, has announced the appointment of Applied Engineering Company, 500 Piedmont Ave., N.E., Atlanta, as distributor for Gilsulate in North Georgia.

Midwest Piping Co. — SW

Included in recent promotions announced by the **Midwest Piping Company, Inc.,** is Louis H. Niebling, formerly Chicago District Manager, who has been appointed General Manager of Southwest Operations with headquarters in Houston, Texas. He will be in complete charge of all operations including manufacturing, fabrication, construction and sales. Mr. Niebling has been with Midwest for 31 years.

New Morse Mgr.—Md., Va.

Elmer C. Stacks was appointed District Manager in the Baltimore, Virginia and eastern Pennsylvania

E. C. Stacks

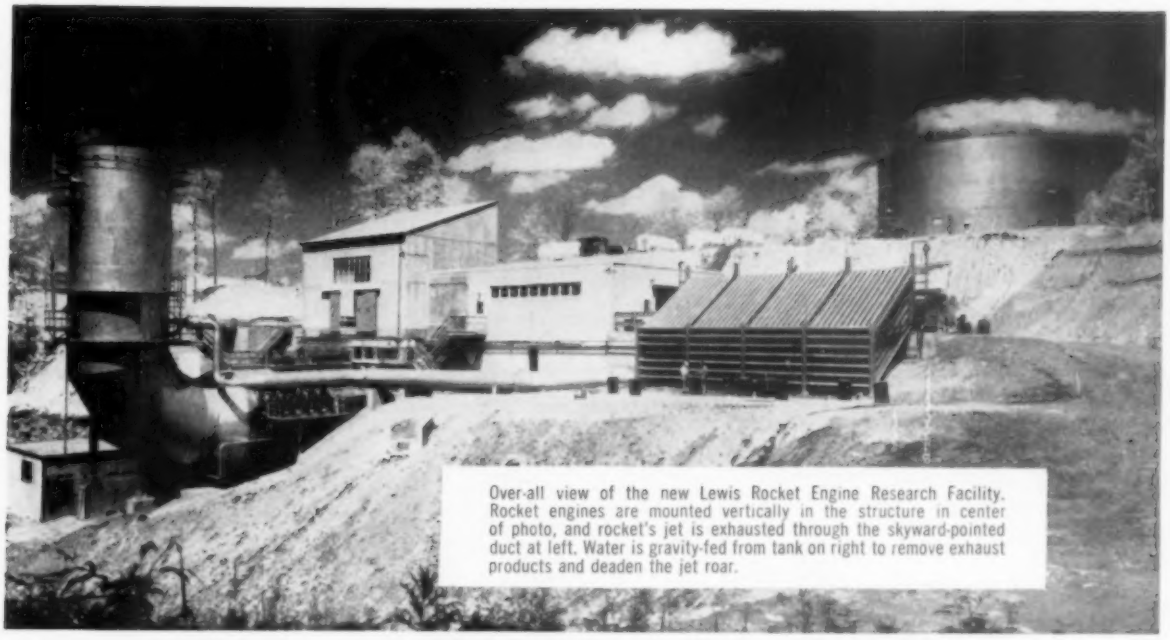
areas for **Morse Twist Drill & Machine Co.,** a division of Van Norman Industries, Inc.

A Morse employee since 1955, Mr. Stacks was a company representative in the Baltimore-Virginia area prior to his promotion. He now has headquarters in Philadelphia.

Almasol Corp., Ft. Worth

The Almasol Corporation of **Fort Worth, Texas,** has been formed as a wholly owned subsidiary of Lubrication Engineers, Inc., to provide solutions for lubrication and protective coating problems in all phases of industry.

R. J. (Dick) Neely and Everette O. Walden have joined with Lubrication Engineers, Inc., to launch the new firm. Since 1957, they have been working as a team, researching and solving lubrication and associated problems at Convair, Fort Worth. They are vice-presidents of The Almasol Corporation. The president is James P. Bell, who also heads the parent company.



Over-all view of the new Lewis Rocket Engine Research Facility. Rocket engines are mounted vertically in the structure in center of photo, and rocket's jet is exhausted through the skyward-pointed duct at left. Water is gravity-fed from tank on right to remove exhaust products and deaden the jet roar.

Armco Retaining Wall Holds Back Slope at New Rocket Research Facility

At the new Lewis Rocket Engine Research Facility, a $2.5-million addition to the National Advisory Committee for Aeronautics Laboratory at Cleveland, an Armco Bin-Type Retaining Wall holds back a steep slope to gain ground for needed roadway space.

With the new facility, aeronautical scientists can use practical-size rocket engines in their research on new high-energy rocket propellants.

In the Laboratory, rocket engines are tested by mounting them vertically in a test stand with the jet directed down into a treatment duct. Within this duct, harmful exhaust products are removed and the engine roar silenced. A scrubber-silencer does this by spraying water at the rate of 50,000 gallons a minute. This volume of water is gravity-fed from a 450,000-gallon reservoir.

Because the entire installation is on a steep hillside, level areas had to be created for the road by cutting into the hill. Problem was to hold back the slope to provide room for a wide roadway at the base. How well an Armco Retaining Wall solved the problem can be seen in the photo at the right.

* * *

Armco Retaining Wall is only one of more than 30 Armco Products for a wide variety of highway, railway, municipal and industrial applications. These products are supplied by 55 Armco Plants and sold by hundreds of experienced Armco Sales Engineers. Use coupon for more data on Armco Walls. Armco Drainage & Metal Products, Inc., P. O. Box 1343, Atlanta, Georgia.

This Armco Retaining Wall, at the base of the slope below the water reservoir, is 331 feet long with a nominal height of 8 feet. The Wall helps contain the slope and gain ground for needed roadway space.

ARMCO DRAINAGE & METAL PRODUCTS, INC.
See address at left.

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To handle the increasingly higher pressures and temperatures required by modern industry, Powell offers the highest quality steel valves with many exclusive Powell features of superior design and construction.

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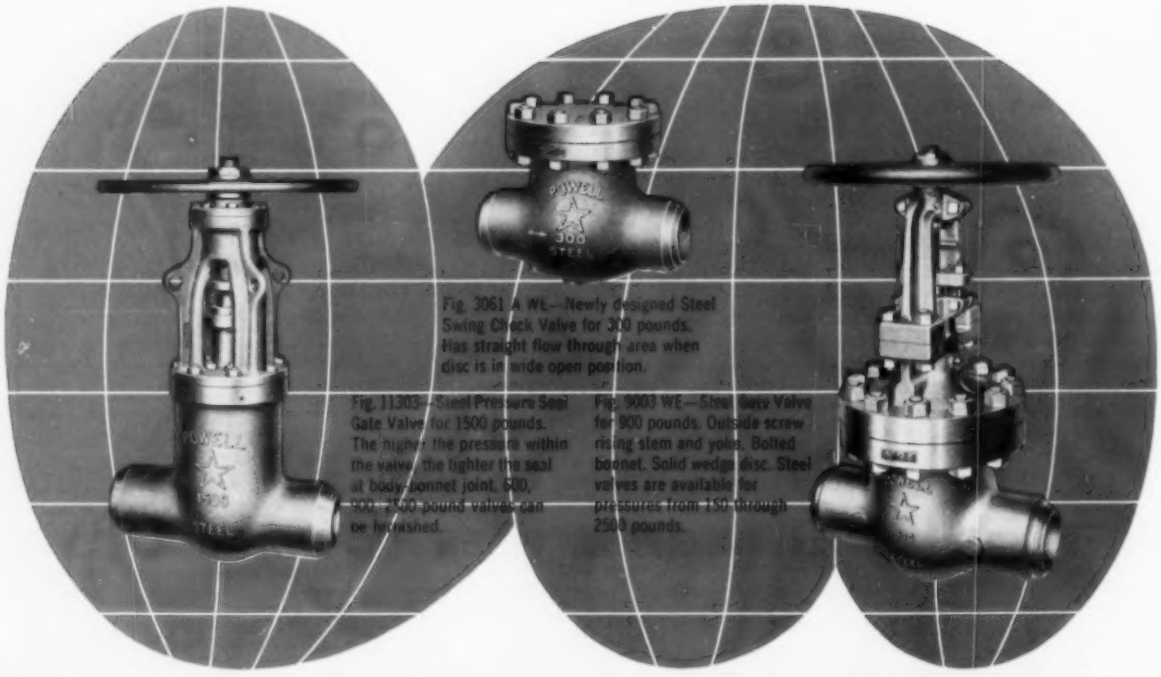


Fig. 3061 A WE—Newly designed Steel Swing Check Valve for 300 pounds. Has straight flow through area when disc is in wide open position.

Fig. 11303—Steel Pressure Seal Gate Valve for 1500 pounds. The higher the pressure within the valve, the tighter the seal at body-bonnet joint. 600, 900, 2500-pound valves can be furnished.

Fig. 9003 WE—Steel Gate Valve for 900 pounds. Outside screw rising stem and yoke. Bolted bonnet. Solid wedge disc. Steel valves are available for pressures from 150 through 2500 pounds.

THE WM. POWELL COMPANY • DEPENDABLE VALVES SINCE 1846 • CINCINNATI 22, OHIO

Southern News Briefs (Continued)

DIPCO — Tennessee

Richard E. Gurley, Jr., has been appointed district sales manager in the Knoxville, Tenn., area for **Dayton Industrial Products Company,** a

division of The Dayton Rubber Company. His territory includes eastern and central Tennessee.

Mr. Gurley was formerly chief of the technical data section with the Birmingham Army Ordnance District and prior to that was a sales engineer with Raybestos-Manhattan, Inc. He attended the University of Alabama, School of Engineering.

Universal Atlas Cement — Waco, Texas

Carl A. Wallerstedt, who retired as manager of the **Waco, Texas,** plant of **Universal Atlas Cement Division** of U. S. Steel after 40 years of service, has been succeeded by Ray Graves, formerly administrative assistant — operating at the New York headquarters.

Mr. Graves was born in Center, Texas, and attended Tyler Commercial College. He joined Universal Atlas in 1926 at the Leeds, Ala. plant. Later he was transferred to the Waco plant and was appointed plant engineer in 1945. He was transferred to New York in 1954, where he remained until his present appointment.

Springfield Boiler — South and Southwest

The Springfield Boiler Company, a subsidiary of Cleaver-Brooks Company, Milwaukee, Wis., has announced plans to build a national sales network to handle its water tube boilers.

Fire tube agencies named to handle the water tube products in the South to date include: **Illingworth Engineering Company,** Jacksonville, Florida; **George K. Moss Company,** Birmingham, Ala.; **Power Equipment & Engineering Co.,** Memphis, Tenn.; **Tate Engineering, Inc.,** Pasadena, Maryland; **Combustioneer Corporation,** Arlington, Virginia; **Fuel Oil Equipment Company,** Miami, Florida; **Applied Engineering Company,** Orangeburg, S. C.; **Frank P. Fischer Engineering Company, Inc.,** New Orleans, La.; **Erickson Industrial Products Company,** Dallas, Texas; and **W. Wallace Neale Company,** Richmond, Va.

Lunkenheimer — Fla.

The appointment of Richard A. McDade as sales representative in Jacksonville, Florida, is announced by the **Lunkenheimer Co.** of Cincinnati. Mr. McDade has an extensive background in industrial sales and sales promotion.

Ball Valve Co. — Kans.

The **Ball Valve Company,** manufacturers of compressor valves, have purchased a larger building at 1009 Main, **Neodesha, Kansas.**

This represents the third move for the company since it was founded in 1956. Each move has been necessitated by a need for enlarged facilities and warehousing. Neodesha was selected because of its convenience to all parts of the country.

The firm is headed by Van J. Sparks, who has been affiliated in the refrigeration and related industries for over 34 years. Mr. Sparks developed the Ball Valve to help eliminate the time and money loss incurred by compressor failures.

B-I-F Industries — Dallas

B-I-F Industries, Inc. of Providence, R. I., manufacturers of meters, feeders, and controls, an-

nounces the formation of Eastern, Central and Western regional operations for its sales organization. The Western Region is headed by Edward F. Morey, Jr. with offices in Dallas.

Eimco — Ala., Tex.

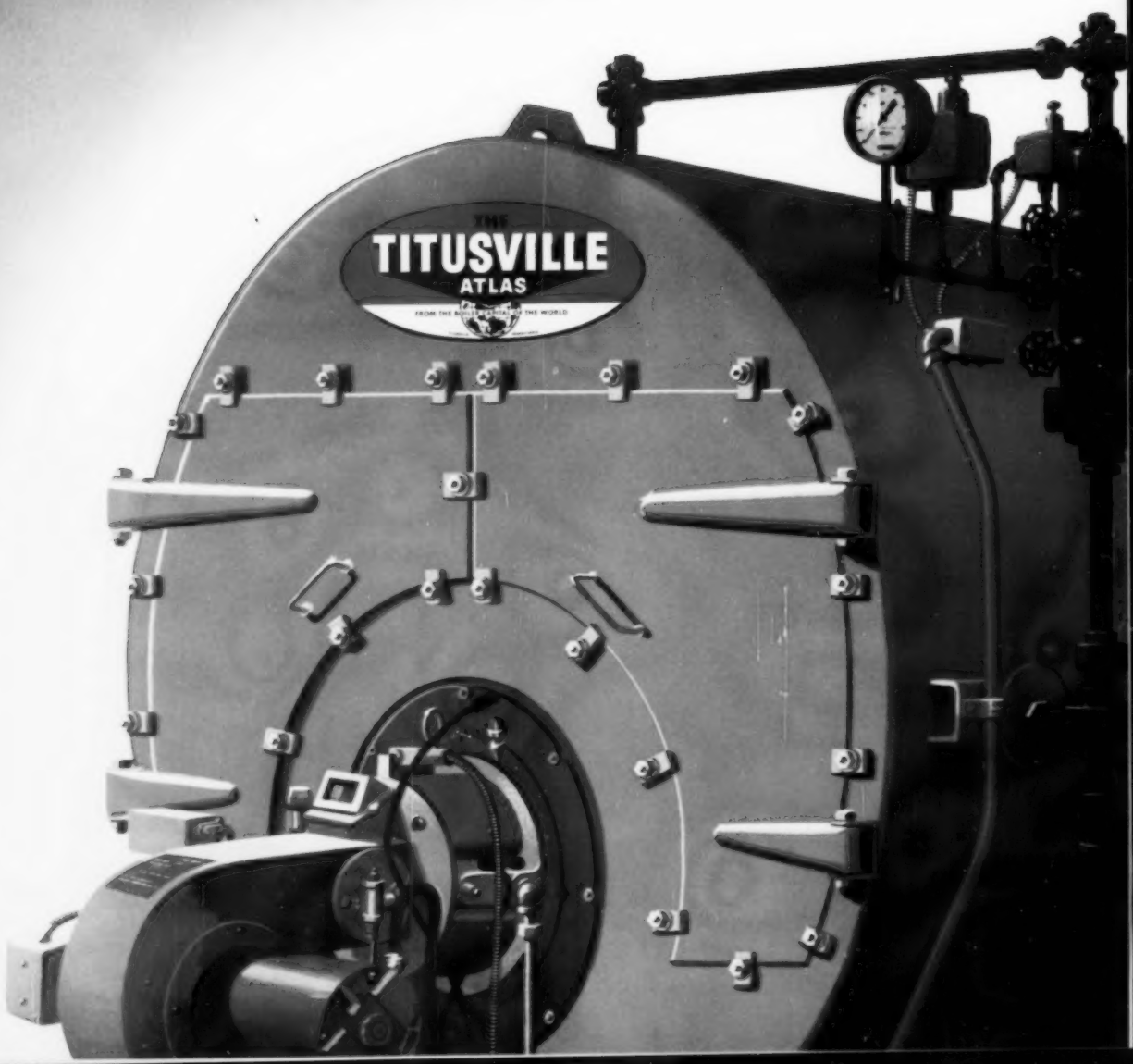
William M. Phillips has been promoted to the post of manager of the Southern District for **The Eimco Corporation.**

Mr. Phillips will be in charge of sales of the Birmingham and Houston offices, primarily concerned with the marketing of products of Eimco's Filter and Process Engineers Divisions. He is a graduate of the University of Alabama and joined the corporation as a sales engineer in Birmingham, where he will continue to have headquarters.

(*Continued on Page* 73)

BONUS

from the Boiler



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BONUS POWER means maintained high efficiency . . . longer life . . . less maintenance . . . more horsepower per total energy input. That's what you get when you install a complete TITUSVILLE-ATLAS unit, the only boiler with a patented wet back.

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Larger furnace area permits reduced fan requirements. *Result:* lower operating costs. Get BONUS POWER. Specify TITUSVILLE-ATLAS.

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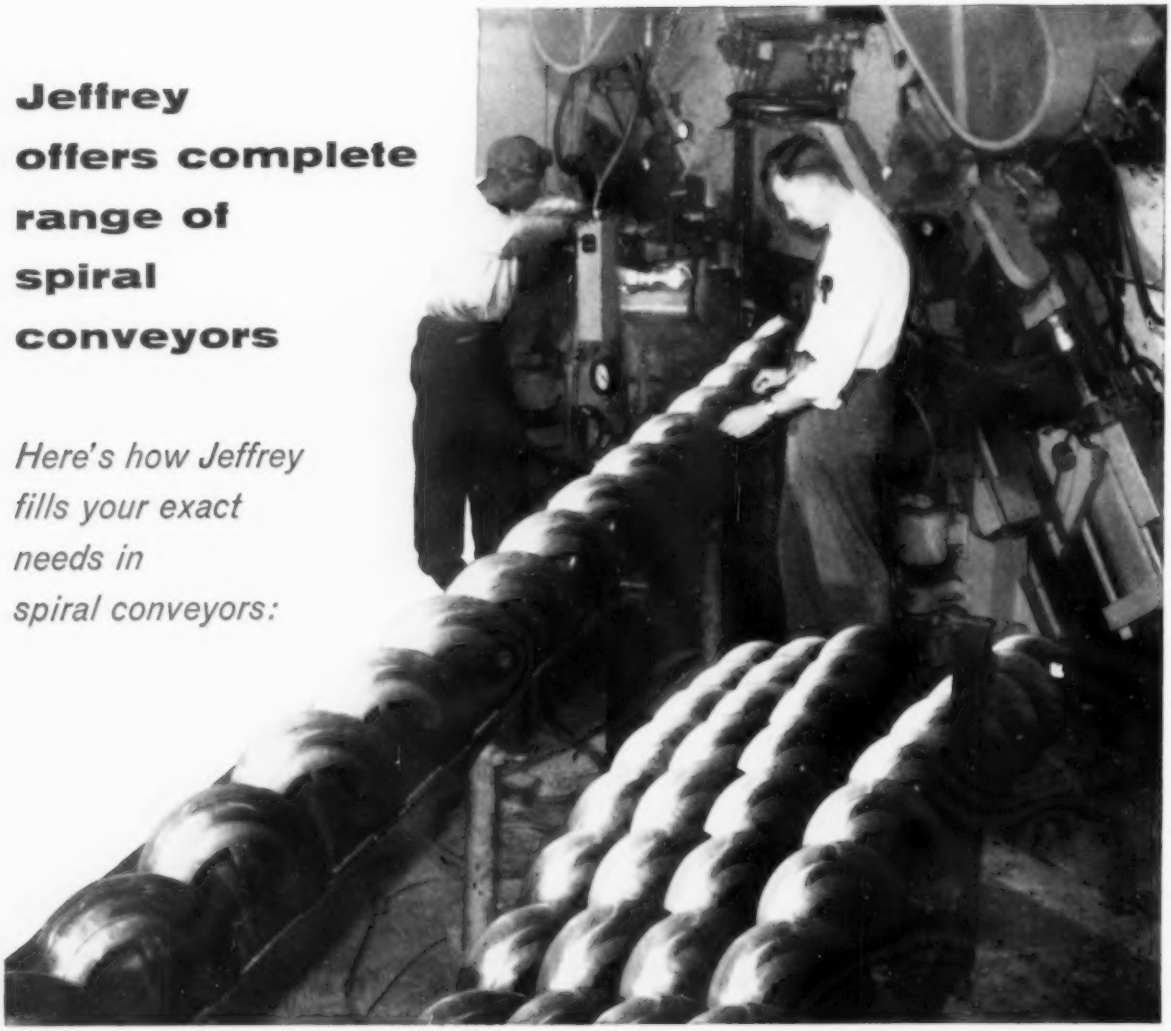
Jeffrey offers complete range of spiral conveyors

Here's how Jeffrey fills your exact needs in spiral conveyors:

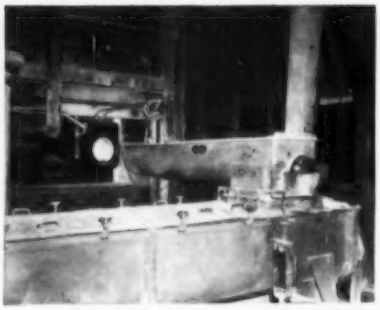


• Complete range of types—sectional spirals, ribbon conveyors, cut flight conveyors, short pitch conveyors, double flight conveyors—all in a wide range of diameters and thicknesses.

• Stock is maintained on all widely used types, permitting Jeffrey to make fast shipment.

Standard conveyors are made in mild or abrasive resistant steels. Where heat-resistance or corrosion-resistance is required, you can select Jeffrey spirals in stainless steel, brass, Monel, aluminum, or other special metals.

With Jeffrey spiral conveyors you get a complete selection *plus* extras in quality—precision fit, smooth flight surfaces and non-toxic protective coating. For full information write for Catalog 951. The Jeffrey Manufacturing Company, 898 North Fourth Street, Columbus 16, Ohio.



Centrifuge cake ranging from 62 to 67 per cent solids are transferred to a mixer by a 16" diameter Jeffrey Spiral Conveyor at the lime reclaiming plant of the City of Lansing, Michigan.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

Southern News Briefs (Continued)

I-T-E — Birmingham

John O. Brown has been appointed manager of the new Birmingham, Alabama, district office of **I-T-E Circuit Breaker Company** at 701 South 37th St.

He will handle sales of the company's electrical products in Alabama and northwestern Florida.

Before assuming the I-T-E post, Mr. Brown was for seven years a field application engineer with Joseph W. Eshelman & Co., in Birmingham. Prior to that he was a switchgear specialist with General Electric Company.

General Electric — Va.

Robert A. Giorgi has been named manager of market development for two-way radio equipment at **General Electric's** Communication Products Department national headquarters in Lynchburg, Va.

Mr. Giorgi will integrate market development efforts of G-E district two-way radio offices throughout the nation and will stimulate sales expansion activities of several hundred manufacturer's representatives.

Commercial Plastics — Ga.

Commercial Plastics & Supply Corp. of New York has opened new sales and service offices and warehouse at 554 North Avenue, N.W., Atlanta, Georgia. The new facility carries the firm's full lines of plastics in sheet, rod, tube and film forms.

John Gillette is general manager of the Atlanta operation. Mr. Gillette's previous affiliations include five years with Air Accessories and five years with Rohm & Haas Company.

Schenectady Varnish Co. — Oklahoma City

Appointment of **John H. Cole Company** of Oklahoma City as a distributor for its electrical insulating varnishes has been announced by **Schenectady Varnish Company, Inc.**

The Cole Company supplies insulating materials to motor repair and service shops throughout Oklahoma as well as parts of Kansas, Texas and Arkansas.

Page Steel & Wire — Tex.

F. Howard Cobb, who had been the Cincinnati resident salesman for approximately two years, has been

appointed to the position of District Sales Manager, Houston, Texas, according to an announcement made by Page Steel & Wire Division, American Chain & Cable Company, Inc.

Diamond Alkali — S.W.

Robert L. Walker has been promoted to the position of branch manager of **Diamond Alkali Company's** Southwest District Sales Office at Houston, Texas. Mr. Walker replaces Martin F. Wilkerson, who has been transferred to the company's Cleveland headquarters.

Yale & Towne — Mid-Atlantic

George A. Wulf, assistant to the senior vice-president of **The Yale & Towne Manufacturing Company,** has been appointed manager of the

Philadelphia Materials Handling Sales and Service Branch of **Yale** Materials Handling Division at 4221 North Broad Street in Philadelphia. His territory includes Maryland, Delaware, the eastern shore counties of Virginia and the eastern tip of West Virginia.

Combustion Engineering Southeastern Offices

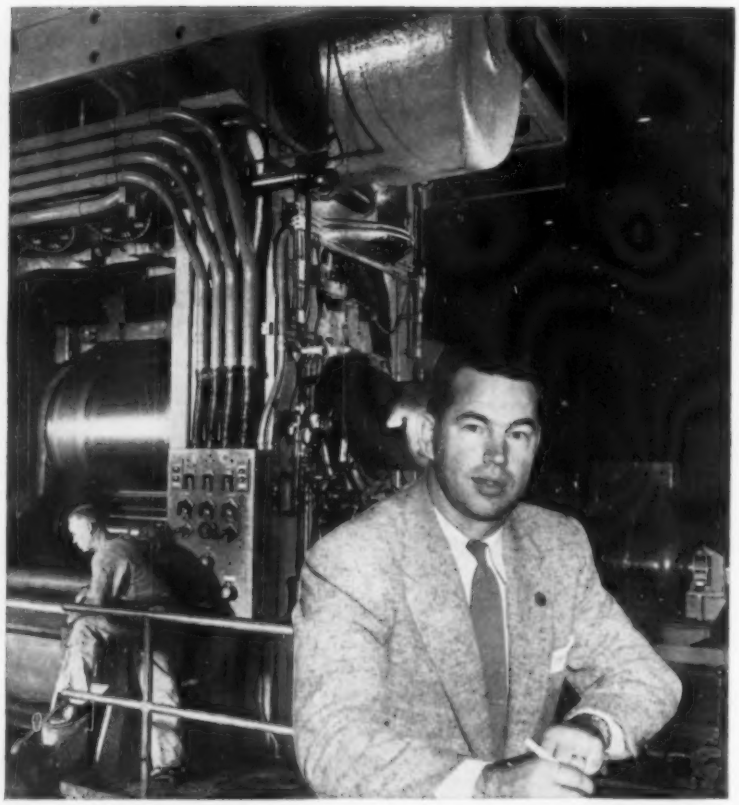
Combustion Engineering, Inc., established two new district offices the first of this year. The new **Charlotte, N. C.,** office in the Addison Bldg., 220 S. Church St., is headed by **Weldon K. Combs,** formerly manager of the Dallas office. **William J. Clemens,** formerly on the sales staff of the Kansas City office, has been appointed manager of the **Jacksonville, Florida,** office in the Prudential Bldg., Room 1423.

Ion Exchange Handbook

(Request copy on your company letterhead)

"Water Conditioning with Nalcite Ion Exchangers," 60 pages, covers ion exchange methods, materials, procedures, equipment and costs. Included technical data: tables, charts, formulas, product data, and suggested solutions to problems.

Write direct to:
National Aluminate Corporation, 2216 West 66th Place, Chicago 38, Ill.



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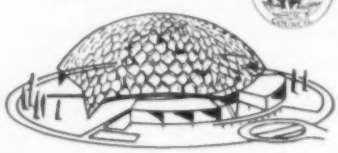
Corrosion
Principles of Machining
Fundamentals of Welding and Joining
Principles of Heat Treating

ACCREDITED MEMBER



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METALS PARK, NOVELTY, OHIO

Southern News Briefs

(*Continued from Page 73*)

Vapor Heating — Carolinas

The **Robert S. Hudgins Company**, Charlotte, North Carolina, has been appointed representative for the sale of **Vapor Heating Corporation** boilers

in North and South Carolina. Mr. Hudgins, head of the company, is shown with Vapor's new Drum Modulatic boiler during a recent boiler familiarization clinic at Vapor's plant in Chicago.

Parker-Hannifin — Dallas

Franchisement of M & M Supply Company, 2716 Mockingbird Lane, Dallas 35, Texas, as distributor for Crown air regulators, filters and lubricators and Parker industrial tube and hose fittings is announced by Parker-Hannifin Corporation.

James H. McGill, president of the newly appointed distributing firm, says that substantial stocks will be maintained to assure prompt servicing of customer requirements. M & M Supply Company also handles Parker o-rings for sealing applications.

Technical assistance on these products will be available from Barney H. Alstad, Parker-Hannifin manager of distributor sales in the Texas district.

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4—Spotcheck — You can save time, money and labor in finding cracked parts quickly and easily with this $36.00 Spotcheck Kit — a dye penetrant inspection technique. Bulletin describes complete fire-safe materials and kit. — MAGNAFLUX CORP.

15—Stress Relieving — Data sheets describe medium frequency (1200 to 12,000 cycles) induction heating equipment for stress relieving of weldments and shrink fitting. Mobile power converters and special cable. — BROWN BOVERI.

17—Mechanical Packings — 32 p Cat. PC-103 describes a variety of packings & gaskets, including self-lubricating, sheet and molded packings, etc. Includes application charts and price information. — GREENE, TWEED & CO.

18—Maintenance Ideas — 4-page folder highlights 90 ways Kano Kroil and other products can help the man-in-the-plant.—KANO LABORATORIES.

20—Lubrication Manual — Selection & application of right lubricant for 560 lubricated plug valve applications featured in 12 p manual. Service and temperature ranges tabulated. — WALWORTH COMPANY.

22—Lubricator Alert — Data sheet describes lubricator flow switch that indicates positive flow at terminal points on any force feed lubricator system. Easily installed on any existing application. Indicates lack of flow to the point of injection. — MANZEL.

31—Stack Maintenance — How wrought iron offers unique defense against flue gas corrosion described in bulletin "Wrought Iron for Flue Gas Conductors." — A. M. BYERS COMPANY.

33—Air Compressor Rod Packing — Catalog 56 shows how "Compressor" No. 760 stays flexible under intense dry heat and protects rods from premature wear. — THE BELMONT PACKING & RUBBER CO.

45—Correct Lubrication — "Lubriplate Data Book" shows importance of providing and maintaining proper and economical maintenance of all types of plant machinery through adequate lubrication. — FISKE BROTHERS REFINING CO.

53—Steam Line Treatment — Folder describes alkaline IPCO S-L-T. Used in boiler water, it will volatilize and travel with steam to return lines. Prevents costly repairs and provides insurance against replacing pipe and fittings. — IPCO LABORATORIES, INC.

64—Anti-Corrosive Paints — Bulletin "The Application of Subox and Subalox Paints" — Gives the story of a complete paint system for weather, moisture and alkali protection, with details as to application.—SUBOX, INC.

78—Control Heat & Glare — New folder tells how Sun-X Glass Tinting (transparent alkyd - based liquid plastic by duPont) is applied directly to existing glass by flow process without spray or splatter. Bonds tightly. Wash in usual manner. — AMERICAN GLASS TINTING CORP.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

107—Proportioning Pumps—4 p brochure illustrates and describes company's proportioning pumps and package chemical feeding units. Includes applications and specifications. — THE BIRD-ARCHER CO.

120—Continuous Blow-Off Equipment — Publication No. 5700 shows how equipment can effect substantial savings in heat and fuel by returning the heat contained in the blow-off. System also maintains uniform dissolved solids concentration in boiler. Typical applications and lists of users are included. — COCHRANE CORPORATION.

132—Glassed Centrifugal Pumps — 12 page Bulletin 725.2 describes line of glassed pumps for handling corrosive acids and alkalies. Every part of pump exposed to liquid has a tough glass surface. Specification, ratings, dimensions. — GOULDS PUMPS, INC

143—Chemical Feeders — 36 p Bul. 1136 describes metering pumps — types, construction, displacement and operating pressures. Gives handling recommendations for chemicals, acids, etc., and volumetric conversion tables. — MANZEL.

172—Pressure Fans — For 10" to 50" SP and capacities 200 to 13,000 cfm. Dimensions and capacity tables included in 20 p Catalog 857. — CLARAGE FAN CO.

180—Economizer — Bulletin 179 describes cast iron extended surface economizers to provide maximum boiler heat recovery with minimum draft loss and corrosion at low cost.—GREEN FUEL ECONOMIZER CO., INC.

189—Air Traps — Bulletin 289 describes ball float traps for draining water from air, gas or steam lines, or for draining light liquids from gas under pressure. Physical and selection data, prices, etc. — ARMSTRONG MACHINE WORKS.

INSTRUMENTS—METERS CONTROLS—REGULATORS

201—Valves & Gages—Handy guide No. 36 gives data and prices on valves, liquid-level gages and accessories for process and power industries. — PENBERTHY MFG. CO.

205—Draft Gages — Bulletins describe inclined, vertical tube, air filter gages, straight line and dial pointer type, minified draft and receiver type gages, velocity gages and pitot tubes, gas analyzers and steam calorimeters. — ELLISON DRAFT GAGE CO.

206—Process "Indicator" — Cat. 100 B shows how you can have maximum info on all process variables with Panalarm annunciators. Trouble anywhere is signalled instantly — before it can grow big and expensive. — PANELLIT, INC.

209—Liquid Level Controls—Catalog describes controls for almost any liquid, at any pressure, at any temperature. Can be furnished in top-mounting, side-mounting styles, or as external float cage units. Almost unlimited application. — MAGNETROL, INC.

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FEBRUARY, 1960

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213—Meters & Controls — Bulletin G15-1 describes and illustrates systems and instruments used in the measuring, transmitting, receiving, interpreting and controlling of 18 variables normally encountered in power plant and industrial plant operation.—BAILEY METER COMPANY.

222—Pressure Regulators — Catalog No. 77 illustrates and describes application, operation and specifications for a complete line of reducing, back-pressure and pump-pressure regulators.—MASON-NEILAN.

244—Desuperheaters — 4 p Bulletin 1024-A describes steam-assist desuperheating. Charts show the close control of temperature which is possible during wide load fluctuations. Schematic diagrams of piping arrangement and control systems. — COPES-VULCAN DIV.

258—Temperature Regulators—Bulletin 5307A describes temperature regulators that vary the flow of steam or cooling water to heater or process to automatically maintain constant temperature. Includes sizing and capacity data.—LESLIE CO.

279—Instrument & Control Panels—16 p Product Specification G71-7 gives details of construction, dimension, weights, instrument mounting, and accessories for 6 standard styles of instrument and control panels. — BAILEY METER CO.

267—Remote Liquid Level Indicator — How clear, brilliant readings from any angle are possible with this unit is explained in Bulletin WG-1824. Pointer is always visible, even at extreme high and low water levels. Of manometric type with automatic temperature compensation. — YARNALL-WARING COMPANY.

281—Control Valve — 8 p Bul. J-170 describes sliding gate and plate control valves available. Includes engineering data, cutaway drawings, features, application information, dimensional drawings, flow capacities, rating charts, flow curve and sample specifications. — OPW-JORDAN.

PLANT CONSTRUCTION—WELDING EQUIPMENT—SPECIALTIES

301—Vacuum Cleaning Systems — How portable and stationary systems cut costs and increase plant efficiency shown in Booklet P8 and AB-100. Eight heavy duty units (1½ to 15 hp) for cleaning hard to get at areas, reclaiming valuable materials, etc. — U. S. HOFFMAN MACH. CORP.

310—Incinerator — Metal cased, insulated, refractory lined incinerators for industrial and commercial use. City smoke code approved. Fast, economical installation — any size and capacity. — NORTH STATE PYROPHYLLITE CO.

315—Pressure Vessels — Catalog 100 discusses your plate fabrication problems and shows how company custom-fabricates hot water storage heaters, tanks, air receivers, blow-off tanks, etc. Corrosion resistant linings and materials featured. Suggested specifications and other valuable technical data given. — J. J. FINNIGAN CO.

316—Drainage & Construction — Catalog Gen-10658 includes data on drainage and construction products for industrial uses. Includes corrugated metal pipe, paved-invert pipe, Asbestos-Bonded pipe, Multi-Plate pipe, pipe-arches, perforated pipe, water control gates, etc. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

319—Portable Band Saw — Bulletin describes the Kalamobile, a portable metal-cutting band saw. Has rubber-tired 12" wheels and telescoping handles. Capacity 6" rounds - 10" flat. — Machine Tool Div., KALAMAZOO TANK AND SILO CO.

322—Heat Transfer Cements—Engineering Data Book 502 includes calculations, estimating and installation procedures on properties and uses of Thermon heat transfer cements. Contains complete list of Southern engineering representatives. — THERMON MANUFACTURING COMPANY.

330—Elevated Water Storage — 4-color catalog describes the Aquatore — a new elevated water tank design with capacities from 300,000 to 3,000,000 gallons. Many design advantages including no struts or tie-rods.—GRAVER TANK & MFG. CO.

334—Storage Racks — Bulletin 17SP shows how Rackmaster Fittings cut rack-building time as much as 60% by eliminating threading and welding. Pipe 100% salvageable. — THE HOLLAENDER MFG. CO.

335—Classifying Systems — Bulletin explains general operating characteristics of centrifugal and gravitational type classifiers. Curves illustrate high efficiencies achieved in actual installations and indicate particle size distribution of incoming feed, separated fines and coarse material. — BUELL ENGINEERING CO., INC.

338—4-D Wrought Iron — 8 p booklet discusses 4-D Wrought Iron which is 25% more corrosive resistant than standard wrought iron. Illustrated test section, applications and service conditions included. — A. M. BYERS CO.

355—Steam-Jet Cleaners — Bulletins JC-100 and SG-200 describe steam - jet cleaners. Series "R" Speedylectric generates steam to 250 psig and temperatures to 405 F. Larger cleaners available. — PANTEX MFG. CORP.

383—Crushing Equipment — Bulletins 937, and 939, and 949 cover reduction machinery for coal, alum, bones, salt and chemicals. — JEFFREY MANUFACTURING COMPANY.

386—Rigid Frame Buildings—8 page bulletin "Dixisteel Rigid Frame Buildings" — low cost, flexibility of design, durability, and minimum maintenance; also triangular or bow-string truss all-steel roof systems; fabricated for rapid erection. — ATLANTIC STEEL COMPANY.

PIPING—VALVES—FITTINGS STEAM SPECIALTIES—TRAPS

402—Forged Steel Valves — General Purpose Valves, Supplement No. 1 to Catalog F-9, covers gate, globe and angle valves. ½" through 2" sizes, for 150-800 pound service. Featuring 13% chrome stainless steel trim with hard facings. — HENRY VOGT MACHINE CO.

403—Valve Operators—Folder shows how re-designed sprocket rim makes any valve readily accessible from the floor. Simplifies pipe layouts, prevents accidents, fits all valve wheels. — BABBITT STEAM SPECIALTY CO.

405—Temperature Problems — 4p folder "Service for Efficient Thermal Conservation" covers insulation solutions for high and intermediate temperatures, heating & air conditioning-low pressure steam, and ice water and frigid temperatures. — MUNDET CORK CORPORATION.

407—Piping Materials—Bulletin reports on intensive investigation into problem of main steam piping materials and gives data on stress rupture characteristics of Types 316 and 347 stainless steel piping adjacent to welded joints. — PITTSBURGH PIPING AND EQUIPMENT COMPANY.

411—Steam Trap Book — 44 page Steam Trap Book contains useful data on trap sizing, calculation of condensate loads, installation and maintenance data. — ARMSTRONG MACHINE WORKS.

416—Control Valves — Illustrated Cat. 305 contains detailed specifications on air-operated control valves. All usual types are described. Technical data are included as an aid to selection. — MASON-NEILAN DIV.

(*Continued on Page* 80)

420—Valves — 24 page Catalog illustrates and describes bronze, iron, steel and corrosion-resistant valves for controlling the flow of water, oil, gas, steam and corrosive fluids. — THE WM. POWELL CO.

429—Expansion Joints — 8 p Bulletin EJ-1915 describes Type W Gun-Pakt expansion joint which features an improved one-piece design of body and gland. Includes data on figuring expansion of pipe lines and suggestions for installing expansion joints. — YARNALL-WARING CO.

437—Piping for Permanence—Bulletin covers a variety of services where wrought iron pipe saves because it serves longer. Corrosion costs you more than wrought iron. — A. M. BYERS COMPANY.

443—PVC Fittings & Flanges—Corrosion resistant polyvinyl chloride pipe fittings & flanges covered in 12 p catalog, featuring characteristics, advantages, limitations, operating pressures, temperatures, field tests, etc.—GRINNELL COMPANY, INC.

465—Water Hammer — Cause, effect and control covered in Bulletin 851. — THE WILLIAMS GAUGE CO., INC.

466—Pipe Insulation — Folder describes Superglas with "hinged action" — manufactured in one-piece, full length sections open easily to speed installation; easy cutting and fitting; temperature limit is 350 F. — MUNDET CORK CORPORATION.

478—Trap Selection — Booklet "How to Select Steam Traps and Other Fluid Specialties" gives valuable tips on which of the four basic types of traps — inverted bucket, thermostatic, combination or float—to use for any installation. — V. D. ANDERSON CO.

BOILERS—STOKERS TURBINES—BURNERS

506—Package Boilers — Practical construction with Continental two pass design described in Bulletin BE100. Units range in size from 20 to 600 hp; 15 to 250 pressures burning oil, gas or combination. — BOILER ENGINEERING & SUPPLY.

509—Free Coal Counseling — General information on how Coal Bureau engineers will advise on selection, transportation and utilization of the right coal for your purpose.—NORFOLK AND WESTERN RAILWAY.

510—Vibra-Grate Stoker — Water-cooled vibrating grate stoker in sizes from 25,000 to 150,000 lb of steam per hour; no dust collector required and assures freedom from smoke, even at low ratings; easily adapted for burning gas or oil in combination with coal, or singly; requires minimum maintenance. — AMERICAN ENGINEERING CO.

513—Power Plant Equipment — 12 page booklet No. 1022-B gives details on combustion and boiler feedwater control, pressure reducing, desuperheating and automatic soot blowing — retractable and rotary. — COPES-VULCAN DIV.

514—Generator Installations — Bulletin GB-1 shows how installations of Amesteam Generators have solved boiler room problems for their owners. Photos illustrate units from 10 through 600 hp for firing combinations of oils and gases. — AMES IRON WORKS, INC.

521—Gas Tempering — How you can burn the most economical fuel available (coal, oil or gas) described in Bul. G-96. Cuts overall plant costs since smaller size unit requires smaller building per kw, etc. — THE BABCOCK & WILCOX CO.

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530—Coal Plant Specifications — 64 page brochure, including 5 drawings, is a comprehensive guide for preparing specifications on coal-fired, low-pressure heating plants in the size range of 750,000 to 5,500,000 Btu/hr. All aspects affected by choice of fuels from storage bin to stack design covered fully. — BITUMINOUS COAL INSTITUTE.

532—Economical Steam — Forced draft, pressurized gas or oil fired units described in SB-59 catalog. Two-drum water tube units include steam trim, draft equipment, burner and combustion safety controls. — ERIE CITY IRON WORKS.

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535—Unit Steam Boilers — Catalog AD-100 — Gives complete information on oil and gas fired "Self Contained" boilers, 15 to 500 hp, 15 to 250 psi for processing and for heating. Gives features, applications, efficiencies, capacities and dimensions. — CLEAVER-BROOKS CO.

539—Industrial Burners — How to keep heating costs low with Hev-E-Oil commercial-industrial burners described in literature SPI-859. Models from 5 to 150 gph; automatic, electronic controls; Hev-E-Duty power gas burners and combination gas/oil burners from 720,000 to 21,000,000 Btu. — INDUSTRIAL COMBUSTION, INC.

543—Soot Blowing Systems — 4 p Bulletin 1015A describes Pneu-Blast system for installations where steam available is at too low a pressure, or where air compressor capacity is less than would be required with other methods of air blowing. Diagrams explain how pressure indexing controls system according to compressor capacity. — COPES-VULCAN DIV.

547—Gas and/or Oil Burners — Bulletin B1 describes large or small, single or dual fuel, packaged or field assembled, atmospheric or forced draft; electronics of all types; competent sales and service. — WEBSTER ENGINEERING CO.

557—Coal — Current brochure on "Prescription Coals." — A. T. MASSEY COAL CO., INC.

571—Oil Fired Furnaces — The Custom Mark II horizontal instant draft furnace described in Form 5973A. Forced warm air heating units, ideal for commereial and small mfgr. plants, can be suspended overhead. Built-in self-powered draft fan valuable in single story buildings. — IRON FIREMAN MFG. CO.

ENGINES—DRIVES POWER TRANSMISSION MATERIAL HANDLING

601—Crane Runway Rails — Catalog gives information on crane rails, angle bars, crane stops, rail elips, hook and anchor bolts, bearing plates. Also speeifications on various sizes of crane rail elips and explains how to order rails. — L. B. FOSTER CO.

606—Retaining Ring Kits — 400 Truarc cadmium plated rings — 84 sizes in one economy kit. Sizes from ¼ to 2½ in. in three most used series of internal, external and universal crescent ring designs — $34.50 per kit.—DIXIE BEARINGS, INC.

614—Vertical Transportation — Elevator Catalog — Describes and illustrates details of passenger and freight elevators, escalators, dumbwaiters, and modernization and maintenance equipment for use in industrial, utility and service plants. — OTIS ELEVATOR CO.

615—Dial Scales — Catalog gives specifications on dozens of standard and special types for industry. Aceessories for printed weight records, remote weight indications, etc. — THE HOWE SCALE CO.

618—Casters & Wheels — Featuring "Lockweld" steel casters without a king-pin, Cat. C-57 describes full line of industrial wheels manufactured and distributed from Rome, Ga. plant. — THE FAIRBANKS CO.

630—Mechanical Vibrating Conveyors — Catalog 890 gives information on conveyability and density of typical solid materials and provides data on how to "Do It Yourself" to get required length. — JEFFREY MFG. CO.

634—Gear Requirements — 8 page catalog describes equipment and facilities available to meet your most exacting gear requirements. South's leading gear, gear products, and power transmission equipment manufacturer. — VIRGINIA GEAR & MACHINE CORP.

651—Bearing Aluminum Bars — Aluminum bearings can replace bearings of other metals which cost twice as much. No sacrifice in performance or life. Catalog 46 covers composition, machining and use. — THE BUNTING BRASS AND BRONZE COMPANY.

WATER TREATMENT—HEATING & AIR CONDITIONING—DUST & FUME CONTROL—REFRIGERATION

701—Exhausting Corrosive Fumes—Bulletin 702-A shows how corrosive fumes can be exhausted with rubber, lead lined or specially coated fans. — CLARAGE FAN CO.

703—Air Conditioning — Bulletin 122 describes and illustrates operation and suggests applications for air conditioning method that controls humidity to 1% rh and temperature to 1 F (up to 140 F) with accuracy, independent of moisture sensitive instruments. — NIAGARA BLOWER CO.

705—Test Your Tower—Bulletin offers simple, proved method by which you can determine how closely your actual tower performance measures up to specified performance. Particularly applicable to operations geared to temperature of process cooling water. — THE MARLEY COMPANY.

707—Mech. Dust Collector — Aerodyne dust collector described in Bulletin 171 combines high efficiency collection with very low draft loss and extreme flexibility of installation.—GREEN FUEL ECONOMIZER CO., INC.

710—Scale Remover—Bulletin shows how Anco Scale Remover quickly eliminates scale in boilers, water lines, refrigeration and air conditioning systems.—ANDERSON CHEMICAL COMPANY.

711—Refrigeration Condensers—Bulletin RC-2 shows how Vogt condensers step up rate of heat transfer and step down head pressures. Closed type for clean waters; film type where water is hard and forms scale. Units save power and refrigeration cost. — HENRY VOGT MACHINE COMPANY.

713—Electric Precipitators—26 page Bulletin 104 shows how units meet five engineering requirements —Positive control of gas flow; high, uniform electrode emission; effective continuous cycle rapping; and safe, trouble-free high voltage equipment. Gives 9 time-tested steps to a successful installation. — BUELL ENGINEERING COMPANY.

716—Dust Collection — Whether nuisance elimination or process material recovery, check on Whirlex Dust Collector Units. Engineering data available. — THE FLY ASH ARRESTOR CORP.

730—Hydrazine — Bulletin BW 8, 10 pages — Discusses chemical reduction of oxygen in boiler feedwater with Deoxy-Sol, a 35% aqueous solution of hydrazine. Gives

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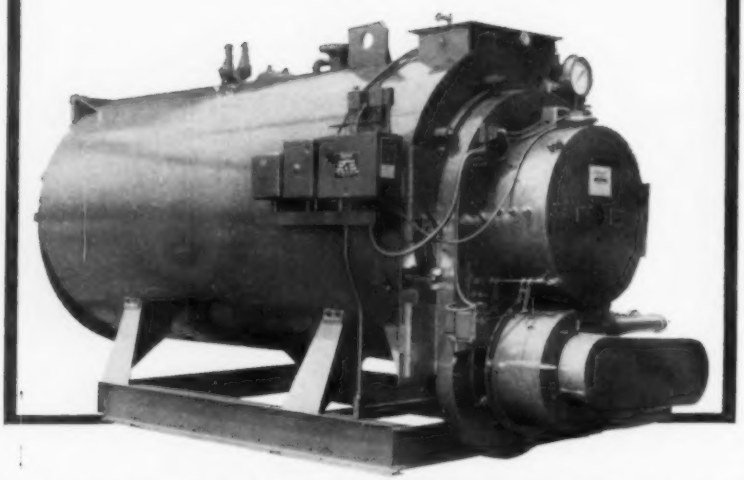

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Phoenixville, Pennsylvania

(*Continued from Page 81*)

flow diagram; covers handling and storage; includes bibliography. — FAIRMOUNT CHEMICAL CO., INC.

737—Water Treating Plan — Separate bulletins combine in folder to form "A Complete Water Treating Plan" for boiler feedwater and cooling water treatment. Leaflets cover various aspects of treatment and equipment. — DEADY CHEMICAL COMPANY.

749—Organic Glucosates — 4-page reprint from Chemical Engineering Catalog discusses increased production and decreased replacement costs and maintenance, resulting from application of Organic Glucosates for control of scale, corrosion and algae problems. — D. W. HAERING & CO., INC.

771—Water Treatment — 4 p brochure points out company's 8-point water treatment coverage for elimination of scale, sludge, corrosion and impure steam. — IPCO LABORATORIES, INC.

ELECTRICAL

801—Motors—Bulletin describes and catalogs more popular a-c motors from 1 to 600 hp, for every process and manufacturing requirement. Single phase and polyphase; surpass NEMA specifications. — BROOK MOTOR COMPANY.

806—Motor Control — Condensed price catalog lists commonly used motor control up to and including Size 4 rating, plus push buttons, limit switches and other accessories. — ALLEN-BRADLEY CO.

807—Motor Bearings — Catalog 258 gives complete listing of cast bronze motor bearings for all makes and sizes. — THE BUNTING BRASS AND BRONZE COMPANY.

813—600-Volt Wiring — How Anaconda Densheath 900 offers long life, high heat and moisture resistance, chemical stability and easy installation is described in Bulletin DM-5612—ANACONDA WIRE & CABLE CORP.

816—High Voltage Protection — 36 p catalog of linemen's protective equipment describes products for utility and industrial electrical fields. — CHARLESTON RUBBER COMPANY.

820—Electrical Maintenance — New contract service (for Southeast only) inspects and tests motors, generators, gearing, control & distribution systems, etc., at a cost less than 1% of value of equipment. — Atlanta office of WESTINGHOUSE ELECTRIC.

839—Power Transformers — 8 p Booklet B-7299 "Preventive Maintenance of Power Transformers Through Modernization" includes component replacement descriptions, adaptations and methods of oil preservation. — WESTINGHOUSE.

842—Circuit Protection — Bulletin FIS describes the maintenance free Fusetron fuses which protect motors, solenoids, coils and transformers against burnout, and which increase production by eliminating needless blows.—BUSSMANN MFG. CO.

855—Wiring Analyzer — 4 page bulletin describes Model 301 Adequate Wiring Analyzer which quickly, simply and easily tests wiring without confusing calculators or slide rules.—SPRAGUE ELECTRIC COMPANY.

894—Control Cable — Bul. DM 5844 gives full technical data on thermoplastic all-purpose control cable with polyethylene insulation, double Densheath (PVC) jackets. — ANACONDA WIRE & CABLE CO.

Late Bulletins

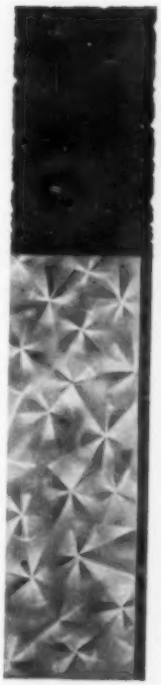
B-1—Coolers & Dryers — Catalog 953, 32 pages, covers electric and mechanical vibrating type coolers and dryers of both direct and indirect types. Sections on basic drying principles and TMV variable amplitude unit. Includes auxiliary equipment. — THE JEFFREY MFG. CO., Columbus 16, Ohio.

B-2—Pneumatic Transmitters—Bulletin 18N, 4 pages, describes Pneumatic Transmitting Rotameters — "position-balance" type instruments which transmit an air signal proportional to fluid rates of flow to remote-located indicators, recorders, controllers. — SCHUTTE AND KOERTING COMPANY, Dept. M-Q, Instrument Division, Cornwells Heights, Bucks County, Pa.

B-3—Industrial Hammers — Catalog, 4 pages, describes entire line of soft-face hammers for industrial use. Illustrates range of plastic hammers, with or without replaceable screw-on plastic tips, a new "no-bounce" hammer, babbitt hammers and tamper drifts.—METO-CRAFT ALLOY & PLASTIC CO., 1039 Memorial Ave., West Springfield, Mass.

B-4—High-Frequency Bus Duct — Booklet B-7326-380, 12 pages, outlines bus duct features and contains a curve of voltage drop at 400

(*Continued on Page* 84)



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(*Continued from Page 83*)

cycles per second plotted against load. — WESTINGHOUSE ELECTRIC CORP., P. O. Box 2099, Pittsburgh 30, Pa.

B-5—Variable - Speed Sheaves — Bulletin No. 6102, 8 pages, pictures and describes stationary control "SVS" variable-speed sheave for standard V-belts, available with two, three or four grooves. Covers non-freezing construction, installation, and other features. — T. B. WOOD'S SONS CO., Chambersburg, Pa.

B-6—High Alloy Castings — Bulletin No. G-159, 20 pages, gives technical data on static castings, centrifugal castings, and shell molded castings. Includes physical properties table for corrosion resistant, heat resistant, and abrasion resistant alloys plus standard designation and stress temperature curves for selected high alloys. — THE DURALOY COMPANY, Scottdale, Pa.

B-7—Industrial Controls — Revised Booklet, 23 pages, entitled "Industrial Temperature Measurement and Control," supplies the process and design engineer with a view of the whole control field and describes line of instruments. Charts, drawings, diagrams. — PARTLOW CORPORATION, 532 Campion Road, New Hartford, N. Y.

B-8—Mechanical Tubing — Folder TDC-193, 6 pages, discusses selection of correct grade of alloy steel for each tubing application, and presents two general purpose steels suitable for standardization, one a through hardening steel and the other a case hardening steel. Gives general characteristics and technical data. — THE BABCOCK & WILCOX COMPANY, Tubular Products Division, Beaver Falls, Pa.

B-9—Circuit Breakers — Bulletin 5001-1A, 40 pages, describes diversified line of molded case circuit breakers. Gives ratings, specifications and operating characteristics to aid in selecting breakers for a wide variety of applications. Includes reference chart, tables, and illustrations. — I-T-E CIRCUIT BREAKER COMPANY, 1900 Hamilton St., Philadelphia 30, Pa.

B-10—Pillow Blocks — Catalog BU-102-A, 4 pages, covers line of malleable tapered roller pillow blocks featuring unbreakable housings, tapered roller bearing, eccentric locking collar, labyrinth grease seals, elongated bolt holes — completely assembled, ready for use. — BROWNING MANUFACTURING COMPANY, Maysville, Ky.

B-11—Valves — Bulletin DV 9-59, 4 pages, describes the No. 171 Type D valves which can be used as pressure reducing or relief valves

or pump governors with steam, oil, water, gas or air. Includes features, applications, operation, installation, and ordering information. Illustrated with photographs, drawings, and capacity tables. — ATLAS VALVE CO., 280 South St., Newark 5, N. J.

B-12—Frequency Meters — Bulletin 32-25, 20 pages, covers new ranges, sizes, and designs of standard and precision resonant reed frequency meters — portable and switchboard models — 2½ in. dia to 9 in. dia. Gives characteristics and prices. — JAMES G. BIDDLE CO., 1316 Arch St., Philadelphia 7, Pa.

B-13—Gearbelt Drives — Catalog GB-201-A, 58 pages, describes line of drives combining flexibility of belt drives with advantages of chain and gear drives, with power transmitted by positive engagement of belt teeth with pulley grooves as in chain drives rather than by friction as in belt drives. Specifications on hundreds of stock items. — BROWNING MANUFACTURING COMPANY, Maysville, Ky.

B-14—Water Problems — Technical Paper No. 139, 4 pages, entitled "Some Causes of Boiler Gasket Leakage" provides some little known facts to help minimize this common problem. Illustrated with photographs. — BETZ LABORATORIES, INC., Gillingham & Worth Sts., Philadelphia 24, Pa.

B-15—Air Conditioning — Bulletin 80-F, 34 pages, discusses principles of refrigeration; history, facilities, and features applying to all Frick machines; give photographs of specific plant applications; cutaway illustration with photographs of components. — FRICK COMPANY, Waynesboro, Pa.

B-16—Conductor Systems — Bulletin No. 2016-D, 4 pages, illustrates and describes "Safpowrbar" conductor systems for providing electrification of maximum safety and long life on overhead materials handling equipment.—THE CLEVELAND CRANE & ENGINEERING CO., Cleveland Tramrail Division, Wickliffe, Ohio.

B-17—Chemical Feeding — Bulletin No. 1800.20-1, 2 pages, describes a pump-tank combination for general chemical feeding and for economic boiler water treatment. Photographs of two models available. — B-I-F INDUSTRIES, INC., 345 Harris Ave., Providence 1, R. I.

B-18—Demineralizer — Bulletin No. 5819, 4 pages, covers line of standardized "Uni-Pac" packaged mixed bed demineralizers, designed especially for process water applications. Illustrated with diagrams and photograph. — COCHRANE CORPORATION, 17th St. below Allegheny Ave., Philadelphia 32, Pa.

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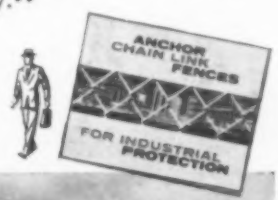

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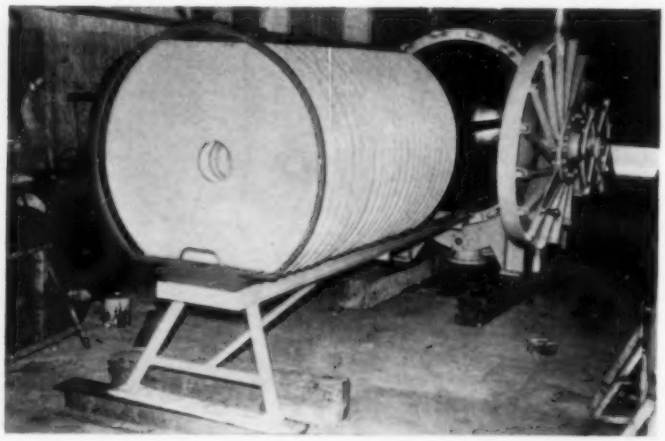
NEW Product Briefs

there is always a BETTER WAY



Condensate Filter

N-1 A filter specially designed for condensate scavenging applications has been developed by **Graver Water Conditioning Co.**, New York, in cooperation with Davis Filtration Equipment Co., New York. It is being offered exclusively by Graver for use in the utility field.

The unit, known as the Graver-Davis Condensate Filter, is of the leaf type, with all-welded stainless steel leaves, stainless steel fittings and a silica-free celluosic material as the precoat. It is unique in that (1) it cleans itself automatically with a centrally-located jet spray, and (2) it has a quick-opening door giving easy access to the leaves. The leaves are nested on a portable cart which can be withdrawn from the filter shell in one minute for periodic inspection.

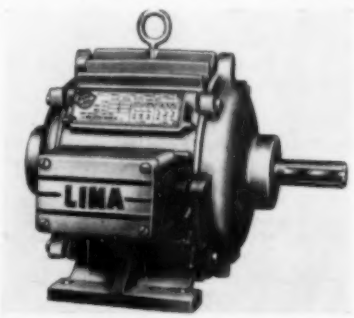
Insulating Firebrick

N-2 A stronger and improved insulating firebrick that is both light in weight and low in thermal conductivity has been placed on the market by the Refractories Division of **The Babcock & Wilcox Company**, 161 E. 42nd St., New York, N. Y.

The mechanical strength of the refractory has been increased by more than 65 per cent for the K-20 and by more than 50 per cent for the K-23 to make possible a wider range of applications. It can be fitted with hangers or pins without danger of breakage. Better mortar bonding and resistance to gas erosion are other important features.

Fan Duty Motor

N-3 The **Lima Electric Motor Company, Inc.**, a Subsidiary of Consolidated Diesel Electric Corporation, announces the availability of its Type EFD Fan Duty Motor in rerated NEMA



frame sizes 182 through 326U (½ through 15 hp). These motors are furnished in speeds of 1800, 1200 or 900 rpm.

These fan duty motors feature in addition to totally enclosed housings, deep external cooling fins that

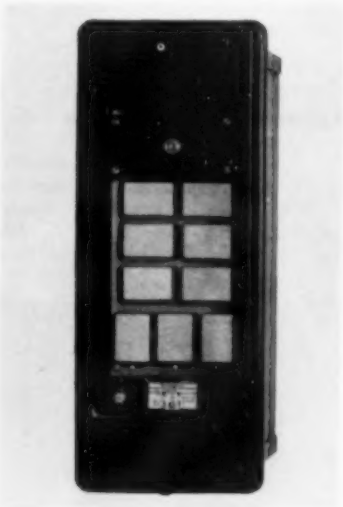
assure adequate cooling with a reduced transverse section to give lowest wind resistance. All cooling surfaces are readily accessible for cleaning if necessary. Duty rating is continuous and temperature rise is rated at 55 C.

Other construction features are seasoned cast iron frames with integral feet, die cast rotors, and double-width prelubricated sealed ball bearings. Windings are heavy multi-coated insulated wire. Uniformity of air gap between rotor and stator is accurately maintained. Motors are available for 3 or 2 phase operation in all standard frequencies and commercial voltages below 600 v.

Differential Relay

N-4

A new high-speed generator relay having all static protective circuit functions providing protection from damage due to three-phase, phase-



to-phase, two-phase-to-ground, and phase-to-ground faults, is now available from the **Westinghouse Electric Corporation,** Pittsburgh 30, Pa.

The relay has a minimum operating current of 0.14 ampere through one restraint circuit and the operating circuit in series.

To give the full measure of protection, no auxiliary transformers or other external components are required. At five amperes, 60 cycles, the burden on each current transformer in the generator leads is 0.25 voltampere.

A minimum of panel space is required because the relay is housed in a case that provides compact mounting.

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This DIXISTEEL Multiple Rigid Frame Building has 41,800 square feet of clear span working area. The complete cost, including sprinkler system, was only $2.71 a square foot.

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$3.32 a sq. ft. for this 7,000 sq. ft. DIXISTEEL Building, including air conditioning and all fixtures.

Beautiful DIXISTEEL Buildings offer the easiest, quickest, most economical way to have a modern structure for any type of business . . . from small work shops to large manufacturing plants.

DIXISTEEL Buildings are available in two complete lines: Standard, with a 4/12 roof slope, and the new Lo-Line with a 1½/12 roof slope.

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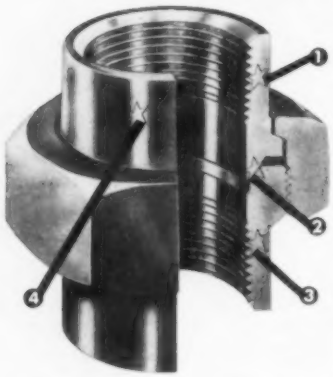

1. **Uniform walls** for even expansion and contraction under temperature changes. They follow the pipe!

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3. **More than adequate** wall thicknesses give you Catawissa's 3-to-1 Safety Factor (3000-lb. service, 9000-lb. test; 6000-lb. service, 18000-lb. test)!

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Catawissa Perfect Seal Pipe Unions are made by Union Specialists from 80,000 lb. tensile strength steel (ASTM Spec. A-105-55T, Grade II). Steel forgings from our own forging mill are closely checked for imperfections . . . and finishing on modern, automatic machines with close inspection during and after production give you pipe unions second to none!

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New Product Briefs (Continued)

All-Aluminum Outdoor Switchgear Housing

N-5 **Allis-Chalmers Manufacturing Co.**, Milwaukee 1, Wis., has introduced a new Aluma-Clad housing design for its metal-clad switchgear, which permits an increased flow of air through filters in the bottom and out of the top of the housing. This feature is a result of the open-labyrinth cross-section of the panels which snap together to form walls, floor and roof. Major sections are joined by aluminum alloy bolts with closed-cell neoprene gasketing between adjacent panel sections.

By combining lightweight aluminum wall panels and I-beam sill channel supports, concrete piers can replace foundation slabs. In addition, the 75-in. service aisle within the weather-proof housing provides an enclosed area with a smooth surface on which to roll high voltage breakers for inspection. Removable floor panel extrusions permit access to the area beneath the switchgear housing.

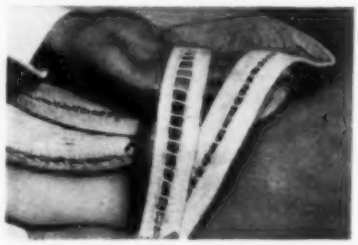
Plastic Pipe

N-6 **A. M. Byers Company**, Pittsburgh 22, Pa., is now supplying polyvinyl chloride plastic pipe in 8, 10 and 12-inch diameter sizes.

These large sizes come in two types: Type I — a pure PVC with excellent corrosion resistance and working properties particularly suited for severely corrosive process services. Type II is a similar product containing a modifier to give it high impact resistance in mechanically punishing, as well as corrosive, applications. In both types, four thicknesses are available.

Asbestos Gasket Tape

N-7 A double-seal asbestos gasket tape, designed for many industrial usages requiring a uniform gasketing that fits around bolts or studs to form



an efficient double seal, has been announced by **Union Asbestos & Rubber Company**, Fibrous Products Division, Bloomington, Illinois.

With this new gasketing tape, it is no longer necessary to make two separate gasket applications on either side of bolts or studs, or to perforate broad gasketing before use.

The tape is available in three types — a plain wire inserted folded asbestos tape with an open lattice, or bolt space; a plain wire inserted asbestos tape woven flat to desired dimensions and bolt space openings and a plain woven non-metallic asbestos tape.

Calcium Stationary Batteries

N-8 The Industrial Division of **Gould-National Batteries, Inc.**, Trenton 7, N. J., has introduced a new line of lightweight, space-saving stationary

batteries for switchgear, alarm system, telephone, control, signaling, emergency light and other applications where batteries are used as standby emergency power. Available in 50 to 1140 ampere hour capacities, the new line is designed for full float service.

A "Plastrite" jar, lighter in weight than conventional containers, saves 30 to 40% floor space, permits increased battery room capacity and reduces storage rack requirements. Easier to handle because of reduced overall weight, the plastic container will not bulge or warp under heat.

Centerline Mounted Turbine

N-9 **Dean Hill Pump Company**, 4000 E. 16th St., Indianapolis, Indiana, has announced production of a new centerline-mounted steam turbine, available with a complete line of frames and wheel diameters for requirements up to 1000 horsepower, with steam inlet pressures to 875 psig. This single-stage, mechanical drive turbine is also adaptable to natural gas expansion and to other gases such as freon.

In the new turbine, thermal expansion emanates radially from the shaft centerline. Because the shaft is mounted at points in the same horizontal plane as the shaft centerline, vertical shaft movement is minimized.

ON-THE-SPOT SERVICE *NOW!*

Eliminate the danger of insurance suspension or up-grading because of ineffective removal and control of scale, rust, corrosion and sludge in your steam generator, heat exchange equipment, condensers, steam and water lines. Ipco Laboratories Emergency Maintenance Tank Truck cleans equipment surfaces on the spot, with a minimum of downtime. Pioneers in water treatment throughout the Southeast, Ipco Laboratories guarantees to clean your equipment and keep it clean.

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ATLANTA 19, GEORGIA

(*Continued from Page 89*)

Aluminum Fittings

N-10 Addition of aluminum and other alloys to its versatile, low-cost line of light wall "Pipe-Mate" fittings and flanges has been announced by **Tube Turns**

Division of **Chemetron Corporation,** Louisville, Ky.

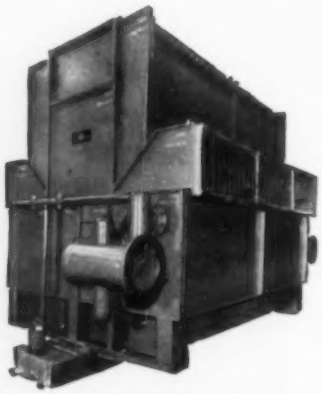
The high strength aluminum alloy fittings will be available in ½" to 4" pipe sizes. They have many potential applications in chemical processing, petroleum, air conditioning, transportation, machinery, shipbuilding, construction, fertilizer and other industries.

Adjustable Speed Drive

N-11 A new, low-cost line of eddy current coupling adjustable speed drives from 5 to 100 horsepower has been announced by the **General Electric Company,** Schenectady 5, N. Y. The new "Kinatrol" line is engineered for a broad range of industrial applications and features simplified design with fewer moving parts for longer service life and sharply reduced maintenance.

The drive is offered as a complete factory tested package, pre-wired for quick, easy installation. Versatile performance is provided over a wide speed range. Ratings through 20 horsepower are capable of continuous operation down to 100 rpm at rated torque providing a speed range of approximately 17:1. On a typical friction type load regulation of 2 per cent of full speed can be obtained with standard equipment. All ratings are in horsepower delivered at output shaft.

ECONOMICAL COOLING OF GASES AND COMPRESSED AIR



Cooling gases or cooling and removing moisture from compressed air, the Niagara *Aero* After Cooler offers the most economical and trustworthy method. Cooling by evaporation in a closed system, it brings the gas or compressed air to a point below the ambient temperature, effectively preventing further condensation of moisture in the air lines. It is a self-contained system, independent of any large cooling water supply, solving the problems of water supply and disposal.

Cooling-water savings and power-cost savings in operation return your equipment costs in less than two years. New sectional design reduces the first cost, saves you much money in freight, installation labor and upkeep. Niagara *Aero* After Cooler systems have proven most successful in large plant power and process installations and in air and gas liquefaction applications.

Write for Descriptive Bulletin 130.

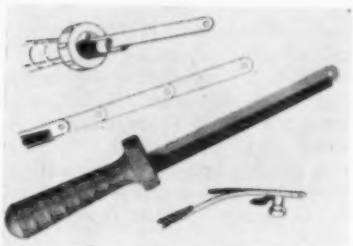
NIAGARA BLOWER COMPANY

Dept. SP-2, 405 Lexington Ave., New York 17, N.Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

Jab Saw

N-12 **Dreier Brothers, Inc.,** 7301 S. Woodlawn Ave., Chicago 19, Ill., is now producing a Jab Saw, which is said to be a completely new kind of tool that



cuts in many tight places where no other saw can operate. This is because of its patented clamping action which holds the blade in any position with vise-like grip. It is easily operated by turning a handle,

will reach 6" into a ¾" hole with rigidly supported blade, and when blade is extended it will reach 10" further. Also, when blade is extended, it can be "flexed" so that it lies flat against a surface and will cut absolutely flush.

The jab saw has a die-cast, metal handle, tempered sleeve and uses any type of hack saw blade. It lists at $3.50 retail.

Portable Welder

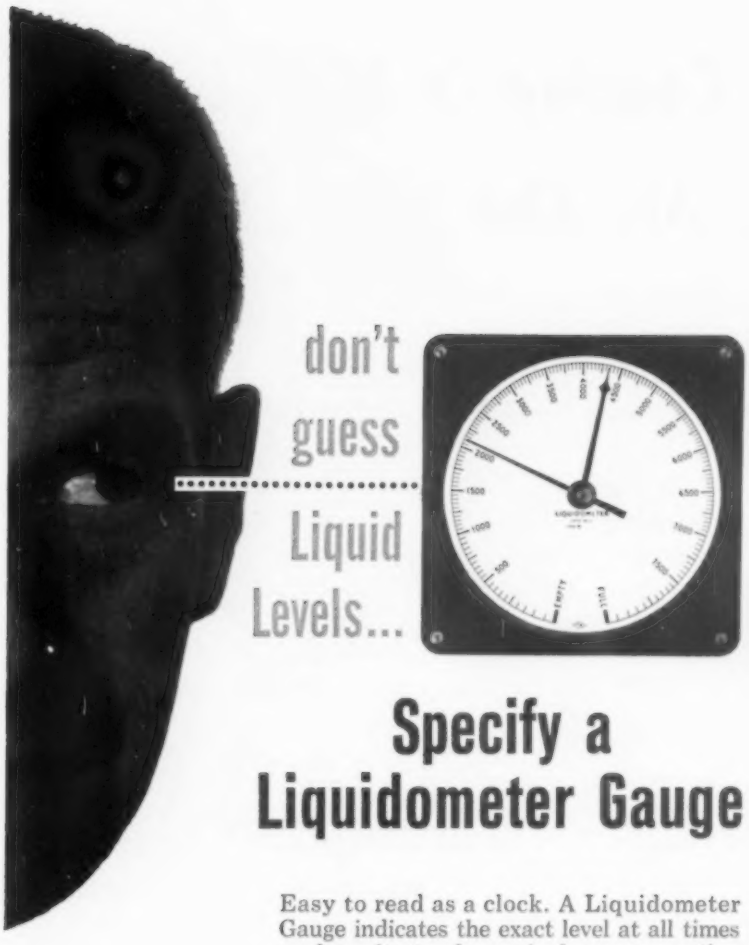
N-13 A new, low cost, 68 lb, portable, 180 amp welder is now being manufactured by **Emerson Electric Mfg. Co.**, St. Louis, Mo.

Light and compact in size — only 21¾" x 14¼" x 10" — which makes it easy to handle the new welder is particularly useful for fast in-the-field welding, brazing, soldering and heating jobs.

Plastic Filter

N-14 A new, all plastic diatomite filter for the efficient filtration of municipal potable water supplies, and industrial process water, has been introduced by Proportioneers division of **B-I-F Industries, Inc.**, Providence, R. I.

Made entirely of corrosion-resistant fiberglas reinforced plastic, the new rectangular filter, Model VFL, uses flat, leaf-type filter elements and top take off. The new style elements lend themselves to rapid build-up of filter aid and easier sluicing when washing. Disassembling is unnecessary.



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Firm Position

Products manufactured
or nature of business

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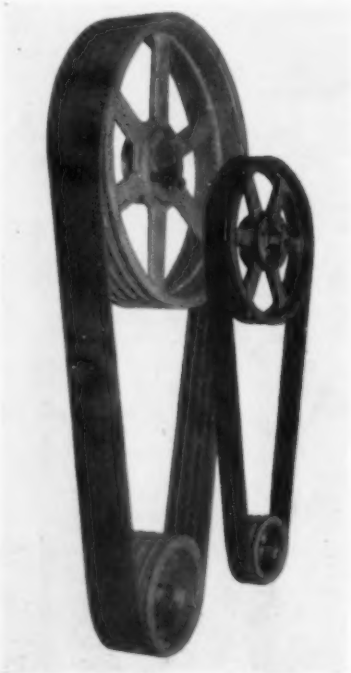
V-Belt Drives

N-15 **T. B. Wood's Sons Co.**, Chambersburg, Pa., has announced that with compact packages made possible through high-strength belts and sheaves, its



new "Ultra-V" drives are capable of handling up to three times the horsepower of conventional V-belt drives occupying the same space. With Ultra-V, the number of belt cross-sections is reduced from five to three.

The deep, narrow belts have greater side-wall area for the transmission of power. Their arched tops confine the tensile members, freeing the side walls for compression and gripping power. The arched top also helps to hold the tension members in alignment and to equalize the load carried by each member. These smaller drives reduce shaft overhang, increase bearing life, cut maintenance costs and simplify inventory and storage. Modern synthetic fibers and rubbers are utilized to the fullest extent.

Water Softeners

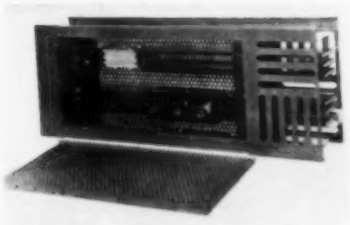
N-16 A new line of commercial capacity water softeners has been released by **General Ionics Corp.**, Pittsburgh, a subsidiary of Salem-Brosius, Inc. Designed for use by commercial and

light industrial applications, the line covers a range of flow rate capacities from 25 to 80 gpm with ion exchange capacities from 175,000 to 600,000 grains.

The system is shipped completely assembled on wooden skids, ready for installation. Stainless steel Spira-Sprays eliminate the need for gravel underbeds, and high capacity resin beds allow for extra long service runs with zero soft effluent, ever high flow rates. Large pipe and valve sizes plus good design make for low pressure drops at rated flows.

Exciter-to-Generator Busway

N-17 Busway designed exclusively for electric utility excitation systems is now available from the **Westinghouse Electric Corporation**, Pittsburgh, Pa.



The new busway can be economically used instead of conduit and cable for a variety of exciter-to-generator systems.

Four types of construction — indoor or outdoor ventilated, and indoor totally enclosed — can be supplied with either copper or aluminum conductors in ratings up to 4000 amp at 500 volts d-c.

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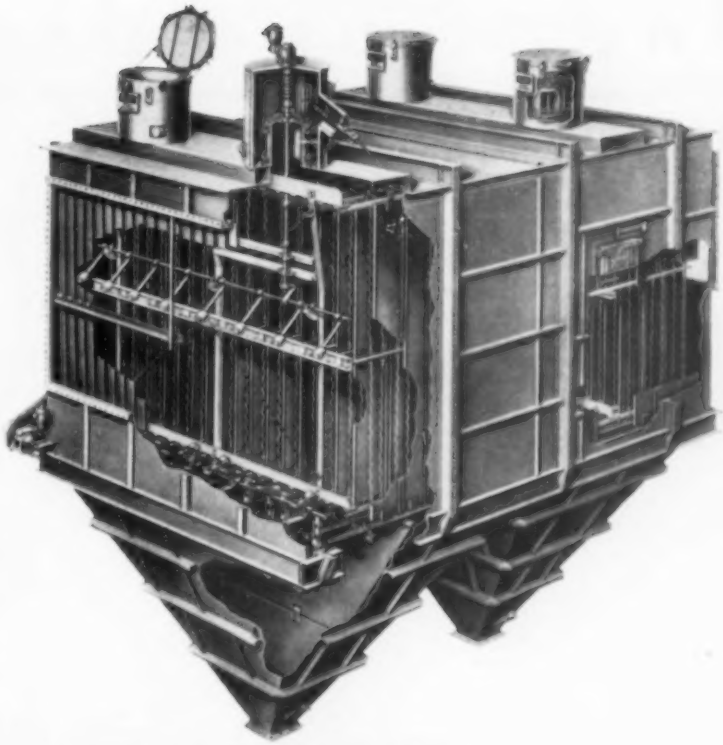

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In 10 years of selling 'SF' electric precipitators, the number of replacement parts ordered from Buell has amounted to only 1.17% of the total sales! Even on emitting electrodes, usually the most vulnerable part of a precipitator, replacement has amounted to less than 1% of the original number installed. What do these extremely low percentages mean? Exceptionally low maintenance costs, for one thing, continuous high-efficiency operation, fewer shutdowns and process interruptions. Buell self-tensioned emitting Spiralectrodes eliminate vibration found in weight-tensioned wires. Buell's low maintenance precipitators will provide you with the most satisfactory operating results. They're backed by 25 years of experience in dust collection, with the practical know-how gained on hundreds of installations. Write for descriptive literature. The Buell Engineering Co., Inc., Dept. 80-B, 123 William St., N. Y. 38, N. Y. (Subsidiary: Ambuco Ltd, London, England)

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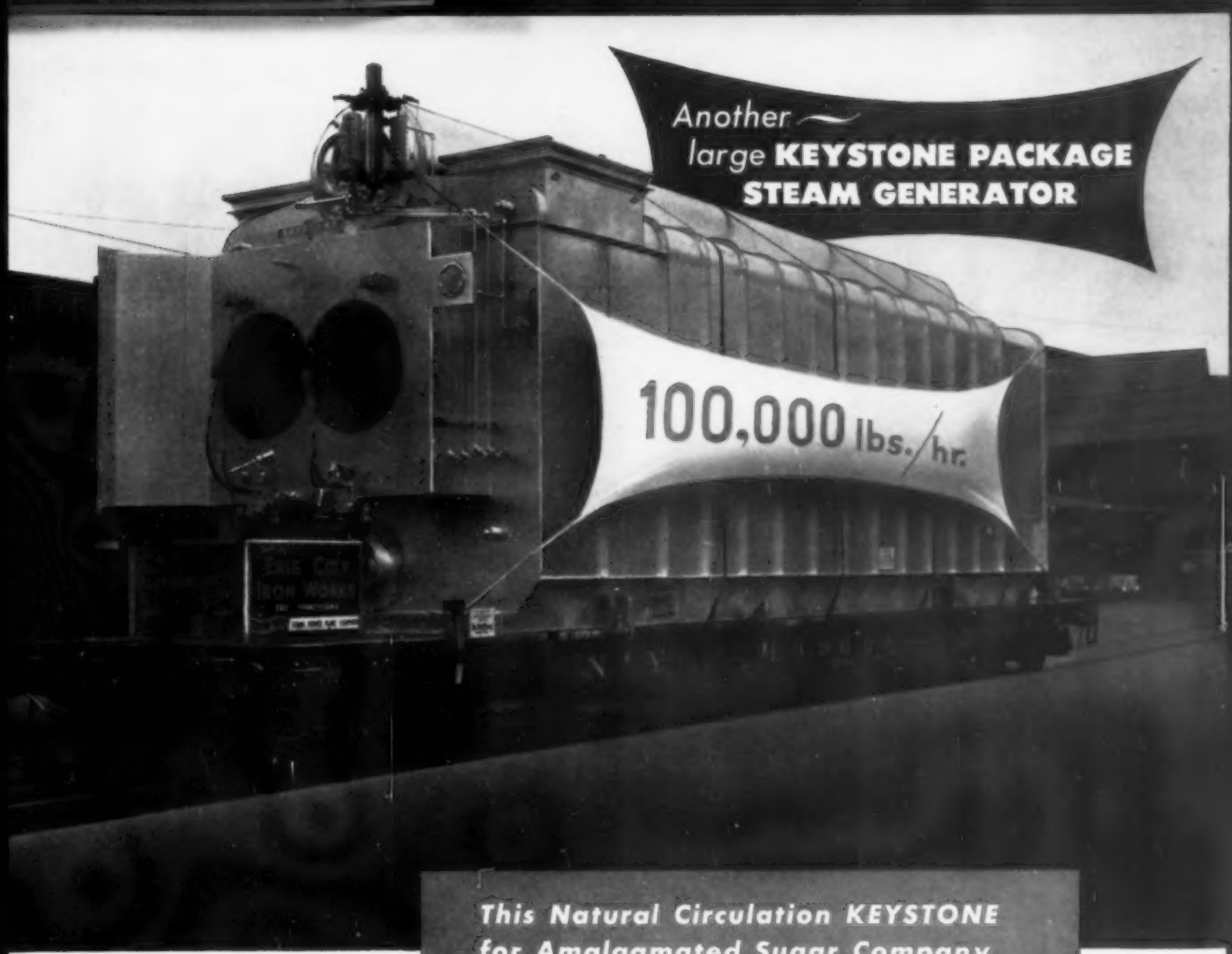

This Natural Circulation KEYSTONE for Amalgamated Sugar Company, Nyssa, Oregon

Other Recent Users of Large Capacity Keystones

- **90,000 lbs./hr.**
  The Bay Petroleum Corporation
  Chalmette, Louisiana
- **80,000 lbs./hr.**
  Oregon Pulp and Paper Company
  Salem, Oregon
- **70,000 lbs./hr.**
  McDonnell Aircraft Corporation
  St. Louis, Missouri
- **60,000 lbs./hr.**
  Bethlehem Steel Corporation
  Sparrows Point, Maryland

The Keystone design was developed in the 1940's for engineers who demand top performance in water tube package steam generators. Unique features of this design make the Keystone the wise choice of engineers who specify and buy package boilers.

- **Symmetrical Design** — Easy to unload — easy to move.
- **Tangent Furnace Tubes** — No troublesome fins or studs required to form furnace or outer walls.
- **Tangent Outside Tubes** — Plus steel jacketed insulation for minimum heat loss.
- **Welded Inner Casing** — Eliminates casing corrosion problems.
- **Light Weight Insulation** — No heavy refractory tile to increase shipping weights.
- **Bolted Outer Casing** — No cutting or patching required when inspection is desirable.
- **Undivided Responsibility** — Firing equipment designed and manufactured by Erie City Iron Works.
- **Minimum of Maintenance** — No baffles — headers — key cap or handhole plates.

Keystones use only tubes for heating surface. No fins, studs or other extended surfaces of questionable value are used. The Keystone packs more real heating surface in the smallest space resulting in lower exit temperatures and highest efficiencies. *Get the details in Bulletin SB5904-B*

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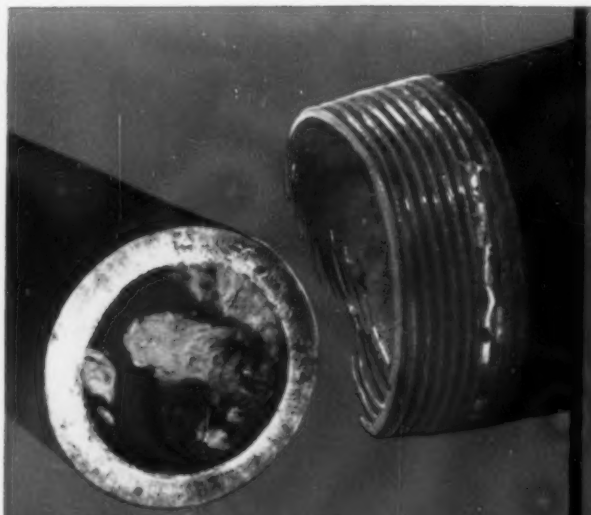
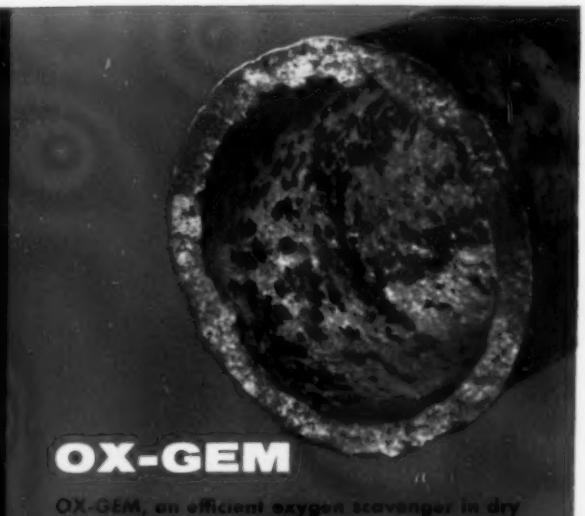
ALKASTEEM & OX-GEM

prevent corrosion in boilers and return lines



ALKASTEEM

ALKASTEEM would have neutralized the carbonic acid which caused corrosion in this section of a condensate line shown in the top photograph.



OX-GEM

OX-GEM, an efficient oxygen scavenger in dry form, would react with dissolved oxygen in boiler water to prevent the pitting caused by this gas. As metal was eaten away in the above section of pipe it followed the water flow to accumulate elsewhere, thus causing a double damaging effect.

save expensive replacements

You can stop the corrosion in boilers, steam lines, steam traps, valves, unit heaters and return condensate lines. Corrosion is frequently caused by dissolved gases such as carbon dioxide and oxygen. When these gases occur in combination the rate of corrosion is greatly increased. If corrosion is allowed to go unchecked the result, of course, is costly shut-downs for repair and expensive replacements.

Throughout the South, hundreds of engineers rely on ALKASTEEM and OX-GEM and the counsel of Anderson's field service representatives to check these corrosive gases. The life of equipment is prolonged and the operating efficiency of your system is increased. The Anderson man is a good man to know.

FREE SURVEY AND ANALYSIS SERVICE

Anderson Service Representatives will be glad to discuss your particular water problems and make recommendations based on an analysis of the makeup water. There is an Anderson representative in your area who will gladly work with you. His services cost you nothing. They can save you much.

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